March, 1943

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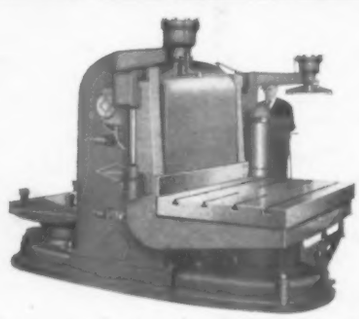
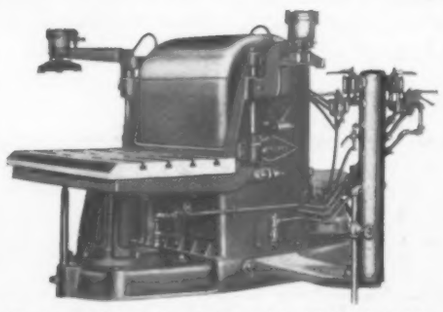
THE FOUNDRY

FIFTY-FIRST YEAR

PHOTO BY U. S. ARMY SIGNAL CORPS



Davenport Jolt Rollover Draw—Nos. 40-48, Model A



Davenport Jolt Rollover Draw—Nos. 28-34, Model A

THE FOUNDRIES of AMERICA

Keep Them Rolling ★

with "DAVENPORT" Molding Machines

Tanks, planes, ships and guns—all are directly dependent upon the foundries of America.

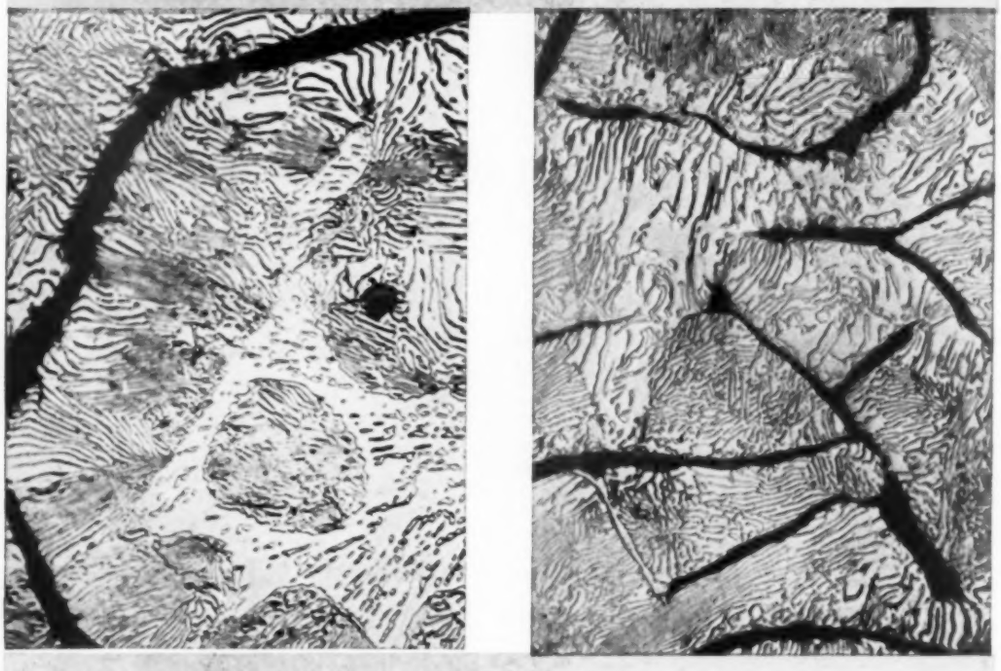
The 1943 war production program calls for more—in fact—much more. Every possible method of increasing production must be utilized. Check over your molding equipment. Is it up to date? Modern? Delivering all that is possible? If you have the least doubt in your mind, we invite you to let us send you our complete catalog that tells why we call "Davenport" the finest molding equipment with capacities from 100 lbs. to 25,000 lbs. made in America today.

DAVENPORT MACHINE & FOUNDRY CO.

DAVENPORT • IOWA, U. S. A.

Refining with PURITE *insures* CLEANER IRON AND STRONGER CASTINGS

The value of Purite in refining cupola cast iron is now generally recognized by progressive foundrymen and metallurgists everywhere. The refining is more than simply removing sulphur. Occluded gases are expelled by the boiling action set up by Purite and entrained oxide-silicates and other non-metallic impurities are washed out of the iron and carried off in the Purite slag.



Untreated **Treated**

Photomicrographs of an all-scrap mixture cast iron at 1,000 X etched with 2 percent nital, before and after refining with Purite. See how Purite refining washes out manganese sulphide and complex silicate inclusions, breaks up the phosphide areas, reduces the size of graphite particles and produces a more uniform, dense structure iron.

Molten iron is always charged with gases and gaseous compounds as well as some non-metallic impurities, more or less varying with the character of the charge, melting practice and refinement of the metal in the hearth of the cupola or in the ladle. These tend to be squeezed out as the iron freezes in the mold, sometimes causing pinholes or gas pockets and segregated defects.

Purite reacts with non-metallic inclusions or silicates in molten cast iron, forming fluid soda slags which rise out of the iron. It combines readily with gaseous sulphur which is held in the Purite slag or is driven off, along with other gases, by the boiling action set up in the iron by Purite. Thus it is seen how refining with Purite, whether in the cupola hearth or in the ladle, increases the strength and improves the grain structure, soundness and machinability of iron castings.

Ask for new bulletin P41 "REFINING CAST IRON WITH PURITE"

THE MATHIESON ALKALI WORKS (INC.)

60 EAST 42ND STREET, NEW YORK, N. Y.

TECHNOLOGY DEPT.

SAFE WAYS IN WAR PRODUCTION

NEW WORKER—Every new employee in a Bethlehem Plant wears this button. It helps to fix his attention on safety. It signals to more experienced employees that he is new to the plant, and they keep an eye on him, and do not hesitate to offer friendly guidance in case he forgets instructions and unknowingly breaks any safety regulation.

Industrial accidents, bad enough because of the human distress they cause, are also a grievous drag on production. Every day that injury lays up a worker means lowered output of the materials our armed forces are asking for.

Safety engineers know they must be more than ever on guard as pressure for production intensifies and men work against time. When war came, Bethlehem Steel Company expanded its accident-prevention program to meet the new conditions. Special efforts were addressed to the new employee to make him safety-conscious from the moment he walked into the plant. And by posters, group meetings and individual instruction, the safe way of doing his job was ground into the subconscious of new Bethlehem employee and veteran alike.

Significant are the results of a current study, showing that of all disabling accidents to Bethlehem employees less than one-third occur in the course of their work. Even with employment rolls upped by the tens of thousands and plant operations at top speed to meet the demands of the war program, the Bethlehem employee is safest, best protected against injury, during the hours he spends on the job.

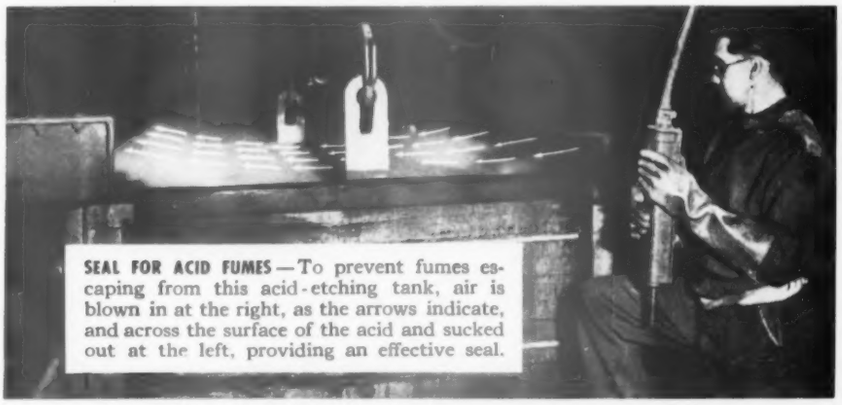
AUTOMATIC HAND GUARD—This man is operating a trimming press. If he should absent-mindedly let his hands move too near the danger zone, the two cables will automatically whisk them back to safety, before the ram of the press descends.

100% HEAT-INSULATED—Asbestos-covered hood, chrome-leather full-length apron, chrome-leather gloves, chrome-leather full-length sleeves and asbestos guard on torch handle give this worker complete protection against heat and flying sparks.

EYES DOUBLY GUARDED—Even though this grinder is equipped with a heavy glass shield, the eyes of the man who is operating it are given further protection against sparks or flying bits of abrasive by the cup goggles that he is wearing.

BETHLEHEM STEEL

Bethlehem Steel Company is actively supporting the National Safety Council in its campaign against accidents in war production, through the War Production Fund to Conserve Manpower.



SEAL FOR ACID FUMES—To prevent fumes escaping from this acid-etching tank, air is blown in at the right, as the arrows indicate, and across the surface of the acid and sucked out at the left, providing an effective seal.

GREEN BOND BENTONIT

WE MINE THE BEST *and leave the rest!*

JUST as the modern lumber camp leaves some of the trees, so do we leave some of the bentonite. There's one big difference, however: Trees are left so they can protect the coming crop—we leave bentonite because it just isn't good enough for our customers. You'd be surprised at the number of deposits that Federal has left untouched. If you use bentonite for any purpose in your foundry it all adds up just one way—you can't buy a better bentonite than Federal Green Bond. It's better because "we take the best and leave the rest."

FEDERAL GREEN BOND
Best of the Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland, Ohio

CHICAGO CHATTANOOGA, TENN. DETROIT MILWAUKEE MINNEAPOLIS NEW YORK ST. LOUIS RICHMOND, VA. Mines UPTON, WYO

THE FOUNDRY

for MARCH 1943

VOLUME 71 NUMBER 3

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The thing he never knew

American —and

Your Core Troubles Are Like the Germans!
Both Disappear When You Apply the Proper Remedy
LINOIL
The Magical Oil for Cores
This Six Inch American Trench Shell
The Werner G. Smith Co.
BOSTON 424 John Hancock Bldg.
PORTLAND, ORE. 365 Williams Ave.
Stocks at Boston, Cleveland, Seattle and Portland, Ore.
CHICAGO 1110 Conway Bldg.

On Both Sides of t
Border an Ocean
Linoil Aids Foundrym
in Meeting Urgent Da
on Basic and Munitio
Castings

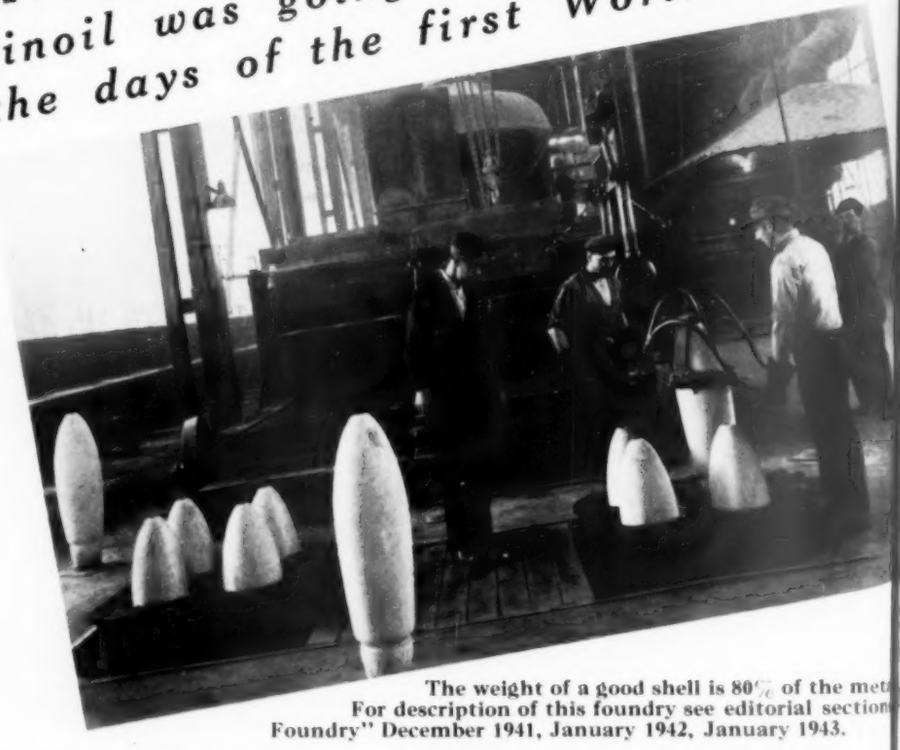
THE DATE HITLER FORGOT

Linoil was going strong back in the days of the first World War

Above advertisement reproduced from "THE FOUNDRY", November, 1918

"We have used Linoil exclusively since the start of ___ ___ two years ago. We go for Linoil in a big way because of its uniformity and even baking qualities, its easy workability, and exceptional high binding strength with easy collapsibility."

Foundry Superintendent



The weight of a good shell is 80% of the met
For description of this foundry see editorial section
Foundry" December 1941, January 1942, January 1943.

THE WERNER G. S

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

PRODUCTION
Canadian

Somewhere in Canada, 24 hours a day, this huge new steel foundry, built expressly for the purpose, is turning out an almost unbelievable volume of 500-pound aerial bombs. "We have used Linoil exclusively since the start of _____ _____, two years ago," says the Foundry Superintendent. His complete letter is printed on the opposise page.

SMITH COMPANY

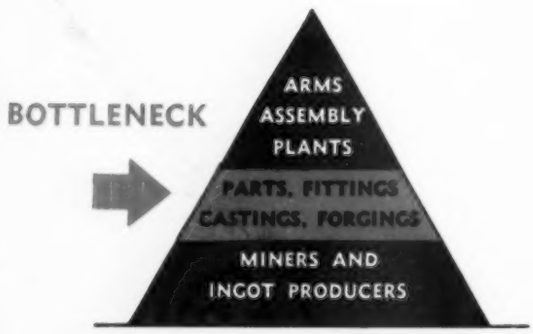
DANIELS - MIDLAND COMPANY)

4690 CLEVELAND, OHIO

"...PARTS, FITTINGS, FORGINGS, CASTINGS--HOLDING UP PRODUCTION

from
*"BOTTLENECKS AGAIN"
Business Week
Issue January 23, 1943

WHY? The miners and ingot producers are delivering the metal. Arms assembly plants are going great guns. But in between—the suppliers—the plants producing parts, fittings, forgings and castings—is where a bottleneck still bogs down production because of S-L-O-W cleaning.



PYRAMID OF PRODUCTION

What a different news story if all plants had Pangborn Air or Airless ROTOBLAST for their cleaning room requirements. One war installation is blast cleaning 2,000 five hundred pound cast steel bombs per day. Hundreds of other concerns, whose orders were smaller but just as vital, depend on Pangborn engineers for the right basic equipment geared to do their jobs faster, better, and at lower cost.

Remember—*cleaning department speed* steps up the whole plant production rate. And Pangborn equipment will do your job better and faster than it has ever been done before. "COME TO PANGBORN."

WORLD'S LARGEST MANUFACTURER OF BLAST

PANG

PANGBORN CORPORATION . . . . . .

BARRELS

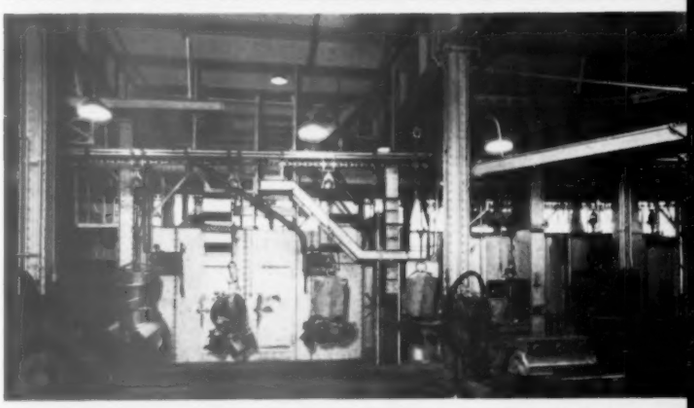
In this modern Foundry doing a big production job, many various size and weight pieces are cleaned in from 8 to 10 minutes in this ROTOBLAST BARREL.

TABLES

Large flat and fragile work is cleaned in two passes on this compact 8′ diameter ROTOBLAST TABLE. Other equipment is a Pangborn Table-Room.

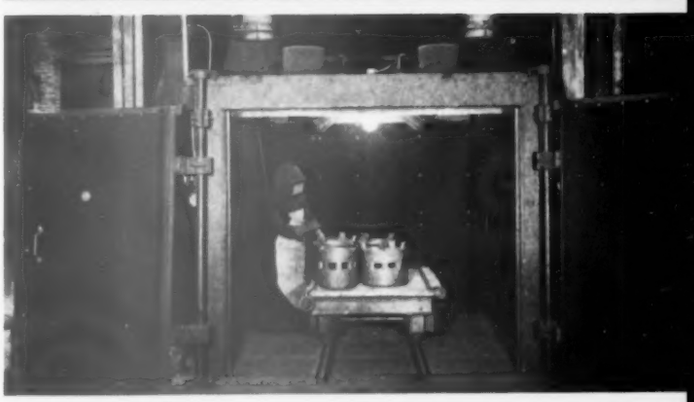
SPECIALS

Line production work such as motor blocks, heads, cylinders, sanitary ware, bombs, etc., requires automatic equipment like this. Work is hung upon hooks. Conveyors carry parts through ROTOBLAST Special Cabinets for blast cleaning.



ROOMS

Heavy, hard to handle, miscellaneous castings are best cleaned by operators in protective clothing—working inside dust-tight, air-ventilated Pangborn ROOMS.



CLEANING AND DUST CONTROL EQUIPMENT

PANGBORN

HAGERSTOWN, MARYLAND

It's One Thing

. . . to declare that all men between the ages of 18 and 38 must secure defense jobs

It's Another Thing

. . . to fit those men into the exacting occupations for which they must be prepared and equipped

The Solution

. . . for the foundry is modern, streamlined equipment — Champion Core Blowers, the products of experience. Any man, woman or child can economically produce perfectly rammed cores on a CHAMPION CORE BLOWER. You merely set the box, pull the lever and in a second the core is perfectly rammed. Small or large, the ramming time is the same and every core is rammed the same. Unparalleled accuracy and uniformity is assured.

CHAMPION CORE BLOWERS are the products of practical foundrymen and are absolutely foolproof in operation and performance. Safety arrangements positively prevent errors of omission or commission. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle.

Rigid one-piece, cast steel frame insures accurate alignment of core box and blow plate. Exclusive Air-Operated Hydraulic Clamp (patented) locks the core box securely against split box separation. Instantaneous blow valve action produces 25% more blow power, decreases air leakage and prevents pressure dissipation,—some of the reasons CHAMPION CORE BLOWERS successfully produce cores that have been stumbling blocks for others.

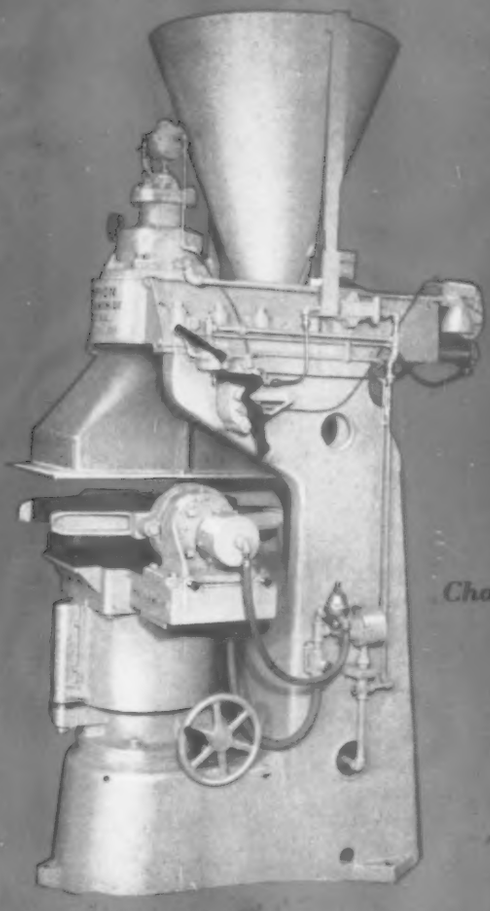
Write us for complete information on Champion's 4 great core blowers.

CHAMPION

Foundry & Machine Co.

1318 W. 21st St., Chicago, Illinois

Champion Core Blowers MODEL CB-400



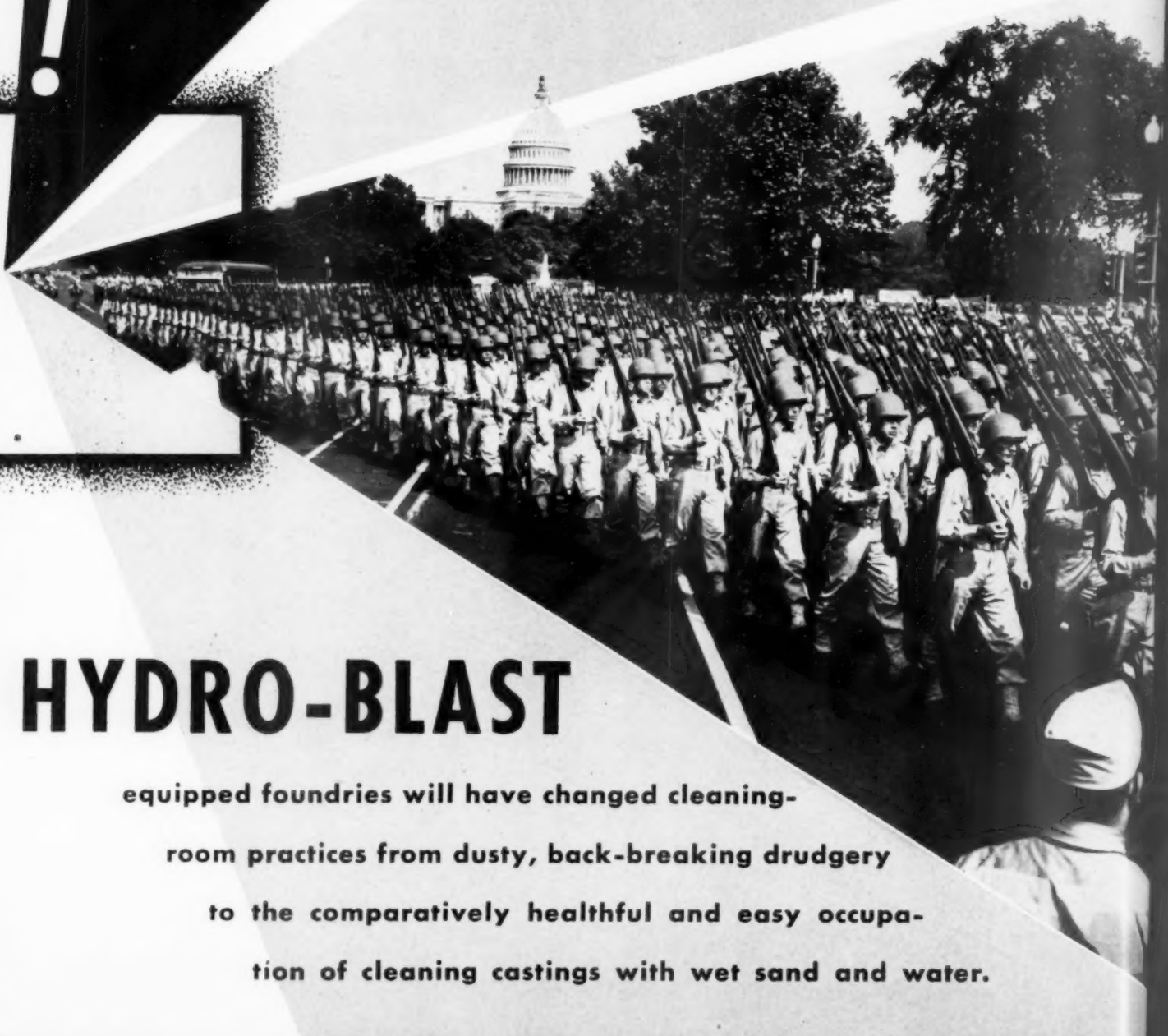
Champion Core Blowers
MODEL CB-15

Champion Core Blowers
MODEL CB-12

Champion
CORE BLOWERS

Champion Core Blowers
MODEL CB-8

WHEN THE BOYS COME HOME!



HYDRO-BLAST

equipped foundries will have changed cleaning-room practices from dusty, back-breaking drudgery to the comparatively healthful and easy occupation of cleaning castings with wet sand and water.

Hydro-Blast decores and surface cleans castings faster, better and cheaper. It scrubs the work to microscopic cleanliness so that less machining is required and machine tools are not dulled prematurely from the abrasive action of imbedded sand particles. The most complex cores quickly give way to the scrubbing, scouring effect of wet sand and water propelled at a velocity of more than 3 miles per minute and at 1,200 lbs. pressure.

Hydro-Blast saves valuable labor, production time and money because it eliminates much pneumatic chipping, uses no compressed air and reduces sand costs as much as 80%. Hydro-Blast saves multimillions of transportation ton miles annually through recovery of thousands of carloads of formerly wasted silica sand. Under other casting cleaning processes, this valuable sand, worth approximately $4.00 per ton is loaded into trucks for disposal as waste, an operation which costs most foundries $1.00 per ton. It washes and dries this formerly wasted sand to any desired moisture content and returns it to the foundry floor in better than new condition.

THE HYDRO-BLAST CORPORATION 2550 N. WESTERN AVE., CHICAGO

Again Hydro-Blast proves its capacity to save transport ton miles, labor and sand to pay for itself within one year

NATIONAL

On the job to help you keep National Equipment operating at top efficiency!

Vancouver

Seattle

Portland

San Francisco

Los Angeles

Important Information for Equipment Operation
SIMPSON
Simpson Intensive Mixers and National Auxiliary Equipment
KEEP IN MAINTENANCE FILE
PRESERVE FOR REFERENCE

This **Service Manual . . .** has been sent to the thousands of users of National Products to help them keep their equipment operating at peak efficiency. It covers installation, adjustment instructions, lubrication, maintenance, repair, etc. It is an example of National Service. If you are a National user and would like more copies, write.

A No. 3 Simpson Intensive Mixer typical of thousands that are in constant operation helping turn out better castings at the lowest cost per ton.

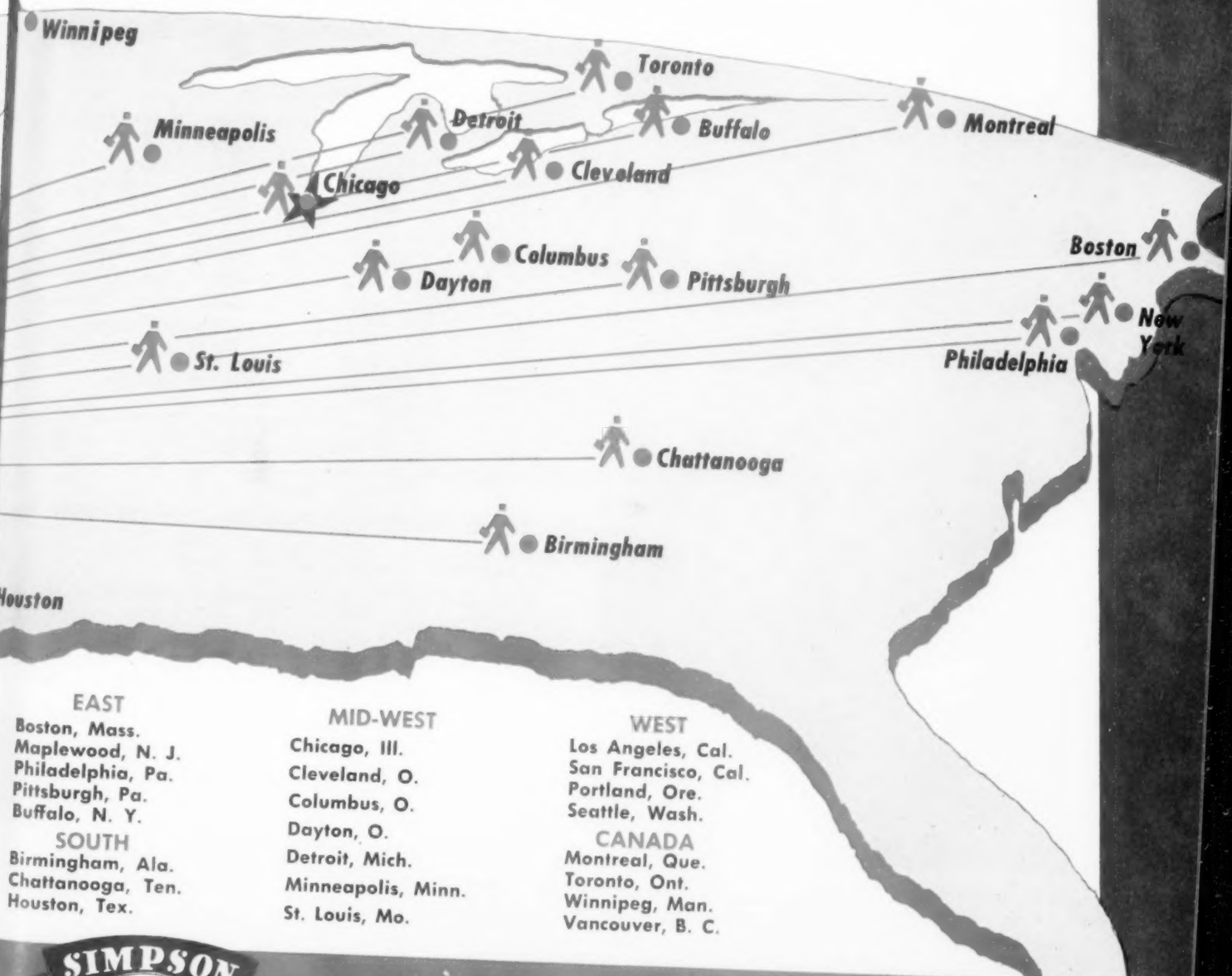
FIELD SERVICE

AMERICA'S foundries are accomplishing another one of industry's super-human jobs:—producing myriad types of vital castings in great quantities. Keeping equipment and machines in perfect operating condition is a "must;" and thousands of maintenance and service engineers are doing it, often under difficult conditions. They are one of the groups of industrial heroes.

Under today's record-breaking production strain National equipment for sand conditioning, handling and control, continues to operate at peak efficiency, *for back of it is experience of design, manufacture and service, unsurpassed in its field.*

East or West, North or South, wherever needed—for problems of maintenance, construction, repair or new requirements — National Field Service is available and eager to help. It is a policy that has, through the years, built an important part of National's reputation for service to the foundry industry.

A wire or telephone call to the office nearest you, or to the Chicago office, will give you emergency action when and if you need it.



EAST
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Houston, Tex.

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Dayton, O.
Detroit, Mich.
Minneapolis, Minn.
St. Louis, Mo.

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San Francisco, Cal.
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SIMPSON
BUILT IN 10 SIZES
INTENSIVE MIXERS

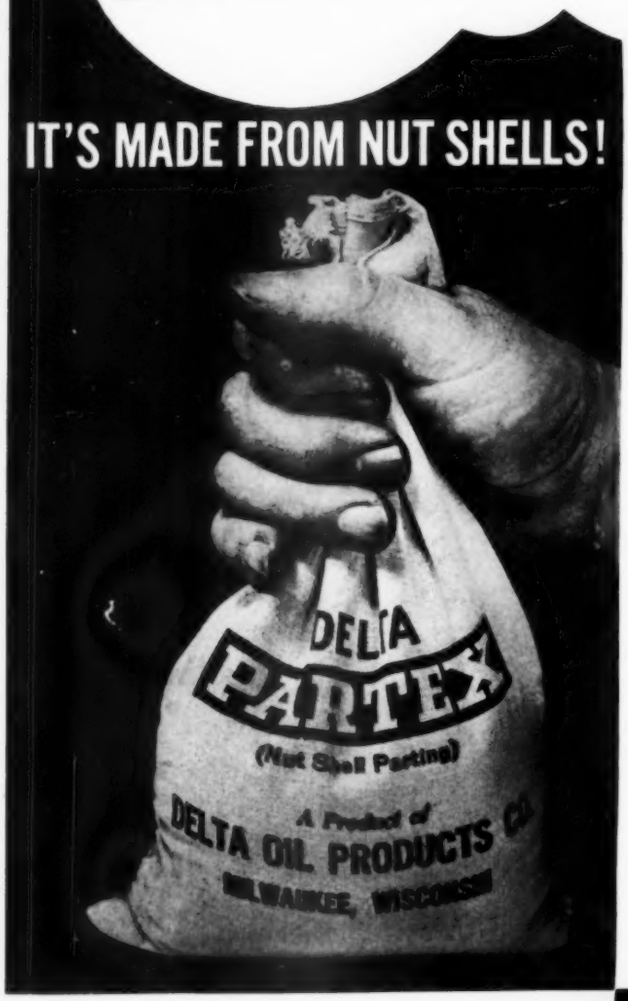
NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

WE SOLVED OUR PARTING PROBLEMS WITH DELTA PARTEX!

IT'S MADE FROM NUT SHELLS!



..AND HERE'S *Why*

DELTA PARTEX (Nut Shell Parting) works faster and lasts longer. With fewer applications, core boxes and patterns stay cleaner. Easier to use . . . dusts freely and does not pile up in corners. Contains no harmful salts nor acid forming properties which, in any way, affect core boxes or metal patterns.

It is safer and more economical to use AND IS THE MOST EFFICIENT SUBSTITUTE FOR LYCOPODIUM.

NOTE THESE IMPORTANT ADVANTAGES

- ★ Absolutely free from Silicosis hazard.
- ★ Has most of the properties and characteristics of Lycopodium.
- ★ Is non-reactive with molten metals.
- ★ It is free-dusting and has uniform surface affinity for sand which eliminates building up in core boxes and patterns.

SEND FOR A LIBERAL WORKING SAMPLE
USE THE ATTACHED COUPON.

DELTA OIL PRODUCTS CO.,
Milwaukee, Wis.

Without obligation, send us a sample of DELTA PARTEX (the Nut Shell Parting)

Name of Company.....

Address.....

Attention of.....

DELTA OIL PRODUCTS CO.

Manufacturers of
Industrial and Automotive Oils, Greases and Compounds.
MILWAUKEE WISCONSIN

Under the sea, too, Royers prove their worth....

OFFICIAL U. S. NAVY PHOTOGRAPH

Many thousands of miles from home, in the western Pacific, American submarines are taking toll of Japanese shipping and warships — speeding the day when Japan's sea power will come to an ignominious end. In North African and other waters, too, our submarines are striking effectively at our enemies.

★

But every part of a submarine must be *right*. A defective part may be the cause of total disaster. Every casting must be the best that can be produced. Every detail in the production of these castings is important, including—of course—sand conditioning. No makeshift methods are employed in the largest submarine construction plant in the world. Here, a Royer Sand Separator and Blender is used to secure proper "6 point" sand preparation. In fact, wherever castings must meet government or other rigid specifications, you will usually find a Royer taking care of the sand conditioning job with speed and efficiency.

The Royer does its work with minimum labor. The sand is given a work-out by the combing belt that cannot be obtained by riddling or screening.

The Royer breaks up lumps, removes refuse, completely blends and mixes the sand, distributes moisture evenly, and increases permeability.

The sand is aerated twice—on the belt and on the discharge. Sand is open and free of gases, velvety and properly bonded; ideal for making pattern molds and smooth castings.

Royers are made in eight portable and stationary models. There is one to meet the sand conditioning needs of every foundry; ferrous and non-ferrous. Over 4,600 in use today.

Write for full information.

THE ROYER

ROYER FOUNDRY & MACHINE CO. *KINGSTON, PA.*

ROTO-CLONE

DUST CONTROL

ENGINEERED TO MEET YOUR REQUIREMENTS WILL SOLVE YOUR DUST PROBLEMS AT

✓ SHAKEOUTS	ELEVATORS ✓
✓ SAND SCREENS	SANDBLAST ✓
✓ BELT TRANSFERS	CASTING CLEANING ✓
✓ MAGNETIC PULLEYS	TUMBLING MILLS ✓
✓ MULLERS	GRINDERS ✓

The Type W Roto-Clone—which combines the scrubbing effect of water sprays with the proven principle of dynamic precipitation—was developed especially for handling fine abrasive foundry dusts containing moisture or steam.

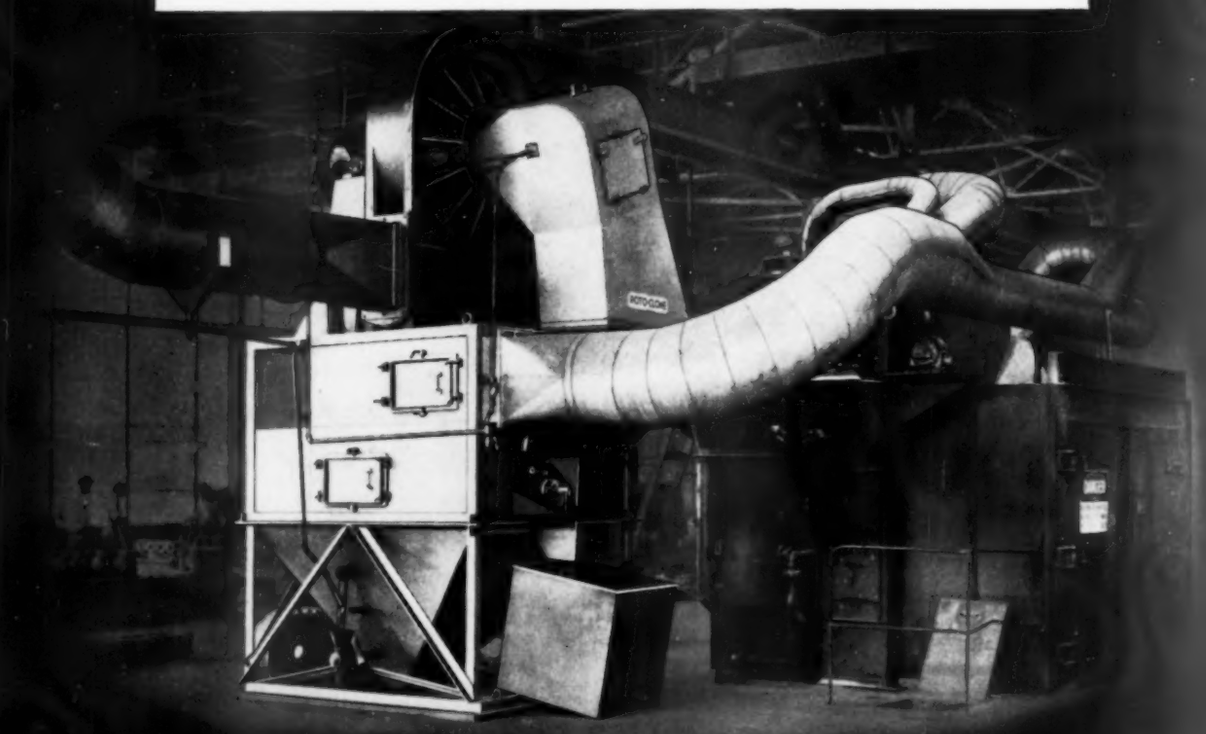
Its compact design and desirable performance characteristics offer distinct advantages where dust in heavy concentration and in a wide range of sizes must be collected.

Send for engineering data and bulletins describing the Roto-Clone —there's no obligation involved.

AMERICAN AIR FILTER COMPANY, INC.
INCORPORATED

265 Central Avenue — Louisville, Kentucky

In Canada: Darling Bros., Ltd., Montreal, P. Q.

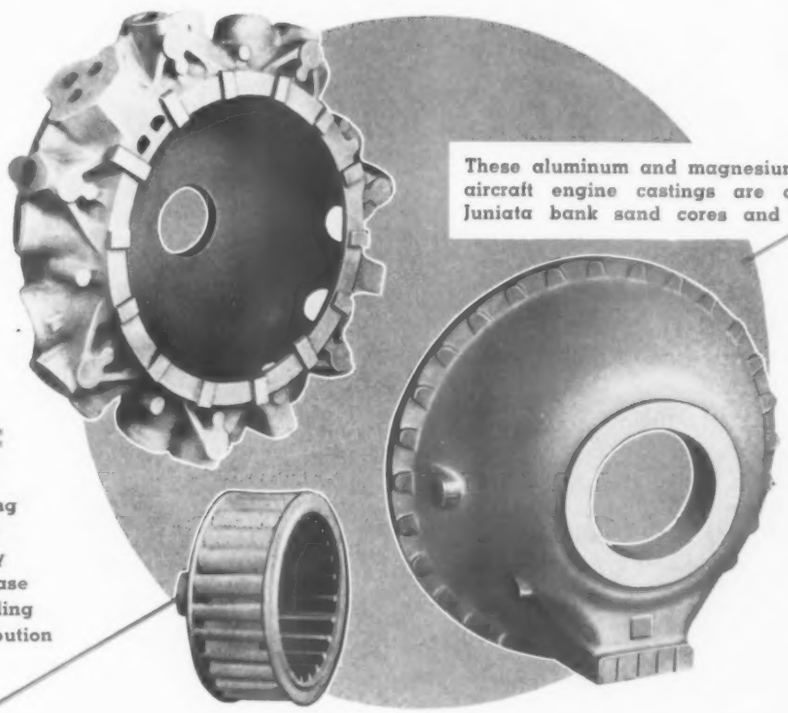


FOR FOUNDRY AAF DUST CONTROL

In War as in Peace

Juniata

The UNIVERSAL FOUNDRY SAND



These aluminum and magnesium alloy aircraft engine castings are cast in Juniata bank sand cores and molds.

IN MOLDS:

Highly Refractory
Permits Hard Ramming
Gives Sharper Profile
Bonds Adhere Readily
Ideal Facing Sand Base
Rapid Mixing or Mulling
Uniform Grain Distribution

IN CORES:

Free Flowing
Saves Binders
Resists Sagging
Smoother Surface
Highly Permeable
No Metal Penetration
No Clay or Lime Defects

FOR INTRICATE AIRCRAFT CASTINGS

The nation wide demand for Juniata sand was met in 1942. Large natural deposits insure a dependable supply for 1943 and the years ahead.

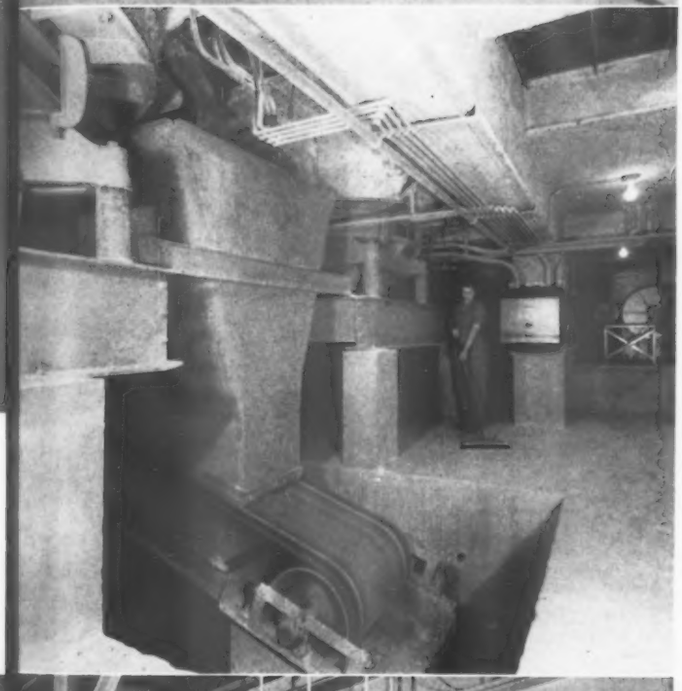
A.F.A. Fineness Grades 60-70-90-135 A.F.A. Clay Content Average .6%

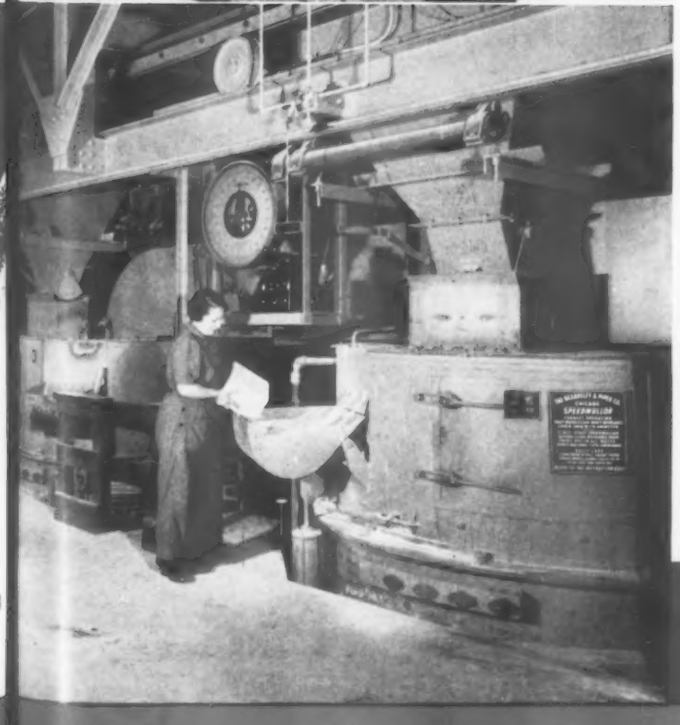
Great Lakes
FOUNDRY SAND COMPANY—DETROIT

MINERS • PROCESSORS • FOUNDRY, METALLURGICAL AND SAND BLAST SERVICE

FOUNDRY SANDS • SILICA SANDS
SHOT—GRIT—BLAST SANDS
REFRACTORIES • BENTONITE
RE-BONDING CLAYS

Are these your Mulling Problems
1 Are you cramped for floor space?
2 Do you lack mulling capacity?
3 Is your sand correctly mulled?
4 Is your cost of oils and binders excessive?
5 Is your core baking time too extended?
6 Does your present mill crush silica grains?
7 Can you cool hot sand?
8 Are your maintenance costs excessive?
SEE HOW SPEEDMULLOR SOLVES YOUR MULLING PROBLEMS





Now Compare

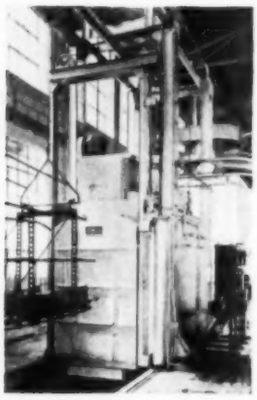
this completely automatic installation operated by woman war workers

The *Speedmullor* has proved beyond the shadow of a doubt that it is the finest, fastest, most productive and most economical mullor ever presented to the foundry industry. Only a *Speedmullor* cools, mulls and constantly aerates sand while it is in suspension around the side walls. This constant cooling, mulling and aerating takes place between the rubber lined wall and rubber tire which cannot crush the silica grains as is the case of steel against steel. *Speedmullor* action squeezes one grain against another while turning the sand over some 200 times a minute. Likewise, it is the only mill that can cool hot sand from the highest temperatures to within 5 degrees of room temperature without extending the regular mulling cycle. It also removes fines when desired, and quickly thaws out frozen sand. It will heat core sand for better oil distribution and then cool it to room temperature.

All of these functions are the result of modern design—as modern and efficient as any mechanism offered to any industry.

THE BEARDSLEY & PIPER COMPANY
2541 North Keeler Avenue • Chicago

YOU can meet aluminum and magnesium specifications with the more uniform and accurate heat of the LINDBERG CYCLONE FURNACE



Box Cyclone of the type used by all leading aircraft manufacturers for aluminum and magnesium.

HEATING UNIFORMITY

because the surface of each piece of the load is bathed in an accurately heated stream of air, driven at high velocities through the work chamber by a large, powerful, dynamically balanced fan. The heat source is isolated from the work, thus eliminating any danger of overheating caused by radiant or "one-sided" heat.

HEATING ACCURACY

because the Lindberg Control (Bulletin 42) automatically measures the input of heat to meet the demands of the load. This is especially important when heat treating the nonferrous metals where long soaking periods are required. As the load becomes saturated, its heat requirements diminish and the Lindberg Control automatically supplies only enough heat to offset the small radiation loss. Control accuracy is such that solution heat treatment and ageing are handled in the same furnace.

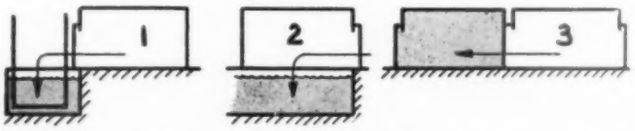
CONSTRUCTION ADVANTAGES

In addition to these heating and control features, the Cyclone is designed for long production life, safety of operation and easy access to all working parts for maintenance or replacement:

1. Heating elements and fan units are located so as to be easily accessible for maintenance or repair. Heating elements are designed for convenient removal for repair without cooling the furnace down.
2. Circulating fans are large volume type, dynamically balanced.
3. Fan is driven by motor of standard make which is replaceable by any other motor with the same nameplate rating.
4. Fan bearings are air cooled and mounted away from the furnace shell.
5. Zone heating is precision controlled to $\pm 2.5^\circ$ F. in even the largest furnaces.
6. Air operated, vertical lift doors with graphited asbestos gaskets prevent heat and air leakage.
7. The Cyclone's 50 different electric box type sizes and 22 sizes of gas fired units gives you a wide range of selection in setting up your production schedule.

QUENCHING

Cyclone furnaces are available, complete with tanks, for different methods of quenching, depending on the work being handled and the speed of quench desired:



1. Elevator quench (for castings)—rack is rolled out of furnace onto elevator which lowers work into quench.
2. Bottom quench (for stampings)—work is held in furnace heat until the bottom is moved out, then quickly lowered into quench directly below.
3. Fog quench (for stampings)—quench chamber is connected to end of furnace and houses a forced, fine spray of water into which work is drawn for quenching.

Write today for the NEW bulletin on Lindberg Furnaces for Aluminum and Magnesium Heat Treatment. Bulletin No. 140.

LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET • CHICAGO

ARMY E NAVY

LINDBERG FURNACES

SUPER-CYCLONE FOR HARDENING, NORMALIZING, ANNEALING, TEMPERING
CYCLONE FOR ACCURATE, LOW-COST TEMPERING AND NITRIDING
HYDRYZING FOR SCALE-FREE AND DECARB-FREE HARDENING

MACKLIN
GRINDING WHEELS

MACKLIN COMPANY

Manufacturer of Grinding Wheels

JACKSON, MICHIGAN, U. S. A.

Sales Offices

CHICAGO - NEW YORK - DETROIT - PITTSBURGH
CLEVELAND - CINCINNATI - MILWAUKEE
PHILADELPHIA

Macklin Grinding Wheels are made in all sizes and shapes for every type of grinding job. No matter what your grinding problem may be there is a Macklin wheel that will show cost saving results and "Protect Your Production". Ask for the services of a Macklin Field Engineer—no obligation.

● *If you use grinding wheels write for Macklin's new 64 page book "Helpful Hints and Safety Suggestions". To such requests on business stationery this book will be mailed free.*

Address:

MACKLIN COMPANY
Dept. P, Jackson, Mich.

Amazing Advancement i

COLEMAN CONTINUOUS MOLD OVENS
Part of eleven high-speed Coleman Mold Ovens which enable highly modern machine tool foundry to break all production records.

COLEMAN PORTABLE MOLD OVEN
Built in wide range of sizes, gas or oil fired, for high speed drying of mold interiors. Better and faster drying, with savings up to 75% over former methods.

COLEMAN CONTINUOUS MOLD OVEN
High speed unit producing marvellous results at mid-west jobbing foundry.

COLEMAN CORE AND MOLD OVENS

THE FOUNDRY E
BUILDERS OF COLEMAN ND
CLEVELAND OH

t in Mold Drying *Speed* with COLEMAN Ovens!

THE COLEMAN SYSTEM of High Speed Mold Drying, an amazing development in answer to the vital war production demands, offers you the advantages of dry sand mold practice in a fraction of former mold drying time.

Highly modern foundries in various fields are now breaking all production records with the help of Coleman High-Speed Mold drying.

Whether your work involves large scale continuous production or the drying of relatively few large or medium size molds, Coleman Mold Drying Equipment will not only do the job faster but better, with amazing savings in fuel.

Backed by over 37 years of outstanding achievements in foundry oven development—and experience gained from over 7,000 successful core and mold oven installations.

COLEMAN CAR TYPE OVEN

For drying molds or baking heavy cores. Built in a wide range of sizes for operation with gas, oil, coke or stoker coal.

There is a right type and size of Coleman Oven for every core-baking and mold-drying job.

COLEMAN Portable Ovens
COLEMAN Rolling Drawer Ovens
COLEMAN Transrack Ovens
COLEMAN Car Type Ovens
COLEMAN Tower Ovens
COLEMAN Horiz. Conv. Ovens

Write for Folio of Bulletins

RY EQUIPMENT CO.
MAN AND SWARTWOUT OVENS
ND OHIO, U.S.A.

COLEMAN CORE AND MOLD OVENS

This Goggle has what this ladleman needs in all-round

COMFORT and PROTECTION

N. F. A. and N. A. S. O. Goggles—now supplied directly to you by American Optical Company—give your foundry workers maximum comfort and safety. Check these features:

COMFORT: The goggles have pliable leather masks . . . wire screen ventilators around the eye-cups . . . AO adjustable one-piece elastic headband that does not catch the hair.

SAFETY: The lenses of these goggles offer the impact-resistance of *Super Armorplate Quality* . . . and can be supplied either clear or calobar glare-resistant.

Ask your AO Safety Representative to show you how these goggles can reduce eye injuries in your foundry.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

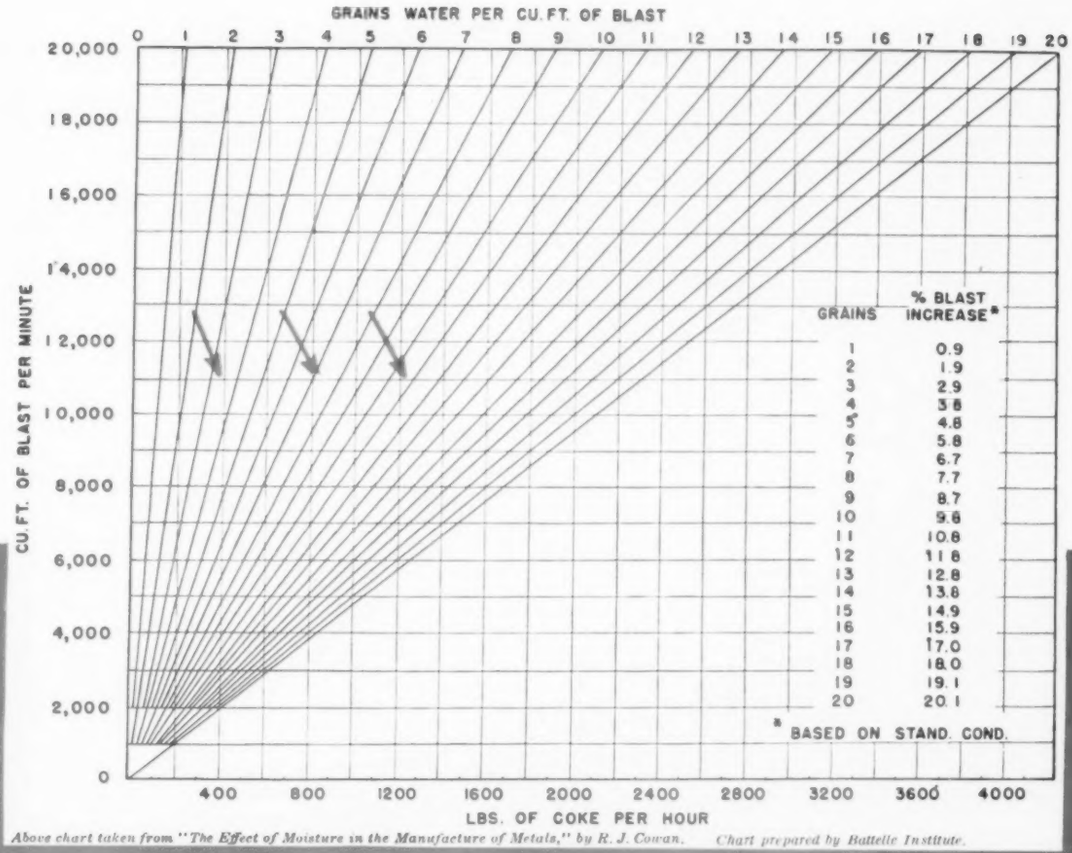


FIGURE YOUR OWN COKE WASTE—This chart shows the amount of coke which must be added to the base charge to compensate for a given increase in moisture content of the blast.

Above chart taken from "The Effect of Moisture in the Manufacture of Metals," by R. J. Cowan. Chart prepared by Battelle Institute.

WHY WASTE COKE ON CUPOLA BLAST MOISTURE?

"As moisture increases in the air blast, so must the coke charge be increased."

This old rule, familiar to every cupola operator, is verified in recent scientific studies. The chart shows how to figure increases or reductions accurately.

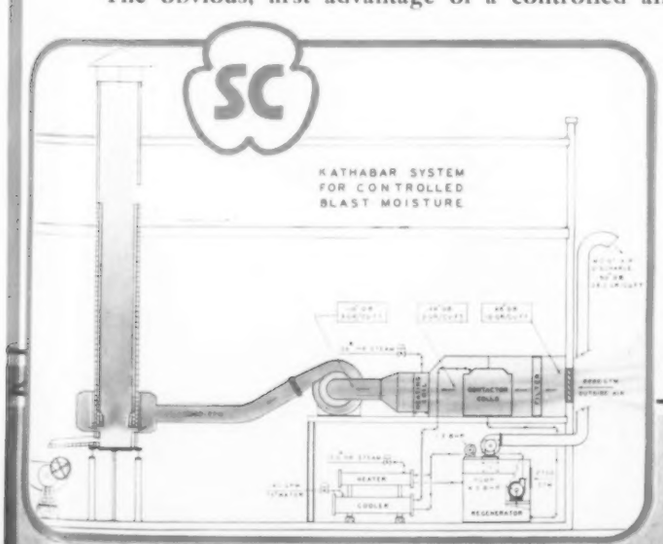
For example, take a cupola using 11,000 cubic feet of air per minute. If the air contains 7 grains of water per cubic foot, it requires 800 pounds of coke per hour addition to the base charge. If the air contains 10½ grains of water, coke addition must be 1200 pounds. But with air moisture reduced to 3 grains, coke addition is only 360 pounds.

The obvious, first advantage of a controlled air blast is the dollar-and-cents saving in reduced coke consumption. On dry air you waste no coke in burning out moisture.

A second, more important advantage of dry blast is that it permits better control of the chemical composition of the metal and the metal temperature. Having to add more coke means supplying more carbon to compensate for the moisture in the blast. This reaction affects metal temperature and its composition or quality.

Greater uniformity of metal through scientific control of blast moisture is what Kathabar provides. Its value has been demonstrated as a fully developed process in ferrous and non-ferrous plants. Kathabar is available NOW as a war production aid for cupola furnaces.

WRITE for your copy of the free, 16-page, illustrated study by R. J. Cowan, "The Effect of Moisture in the Manufacture of Metals."



SURFACE COMBUSTION • TOLEDO, OHIO

Also makers of Janitrol Furnaces and Unit Heaters, and SC Heat Treat and Heating Equipment.

Kathabar

MOISTURE CONTROL SYSTEMS

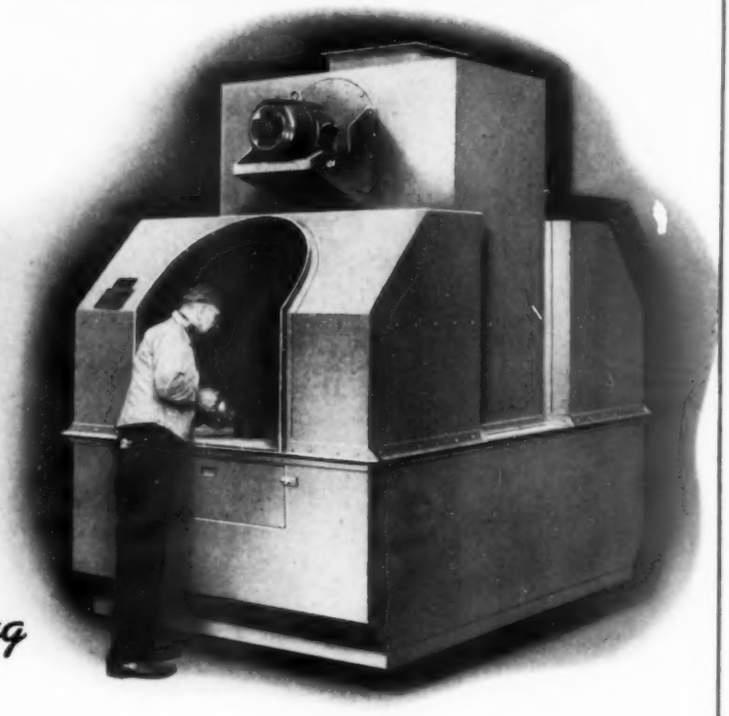
For Cupola, Blast Furnace, and Other Industrial Processing Operations

A SURFACE COMBUSTION PRODUCT

Now...The UNI-WASH PRINCIPLE

Incorporated in

MAGNESIUM CABINETS



- *Exceptional Safety and Efficiency*
- *No Pump...No Moving Parts To Wear Out*

The Uni-Wash principle of arresting dust is now available in cabinets especially designed for magnesium grinding. In these Newcomb-Detroit units, dust-laden air is thoroughly washed by passing through two curtains of water. The exhaust fan is the only moving part. No pump is employed, yet the water is continually recirculated.

These cabinets are furnished as single, double (illustrated) or quadruple units. The air capacity through each opening is 175 feet per minute velocity.

Newcomb-Detroit Magnesium Cabinets are built with automatic water levels. They can be furnished complete with motors and all electrical equipment—ready for immediate attachment to your power lines.

In construction, every feature is incorporated to provide the utmost in lasting efficiency and safety. There is no danger of friction which might produce sparks since all cabinets are lined with either lead or prestwood.

Write for complete details.

NEWCOMB-DETROIT COMPANY

5751 RUSSELL STREET *Established 1912* DETROIT, MICHIGAN

Dust Collectors • Paint Spray Booths • Drying Ovens • Metal Parts Washers and Rust Proofing Systems • Exhaust and Ventilating Systems • Carburizing Systems • Other Sheet Metal Equipment

FAST CUTTING *for the Production Battle*

. . . Norton Resinoid Foundry Wheels

IN THE WAR FOUNDRY fast cutting action is the characteristic by which the wheels must be judged. So the Norton research laboratories set out to produce a "sharp" wheel—one whose cutting action would not easily dull. They started by subjecting the abrasive to special treatments to weed out all but the strong, solid grains that would withstand the severe service of foundry grinding. Then countless resinoid bond formulae were carefully studied and experimented with to develop one with just the right strength—a bond that would hold each grain firmly until its job was done but then release it to bring fresh, sharp grains into action. The result is a definitely faster cutting action—and lower grinding costs.

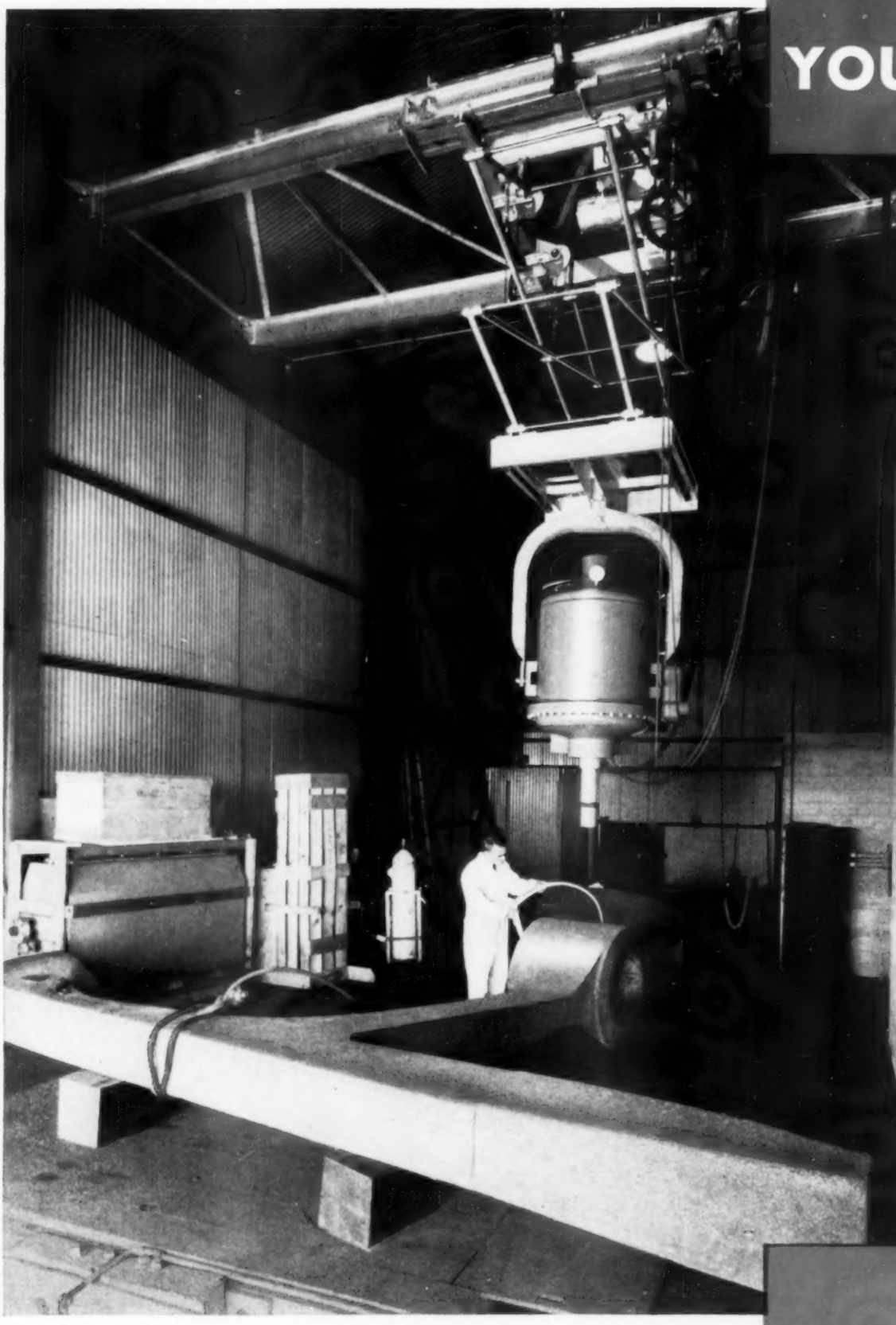
Let a Norton abrasive engineer study your grinding jobs and specify the wheels you need for maximum production.

NORTON COMPANY
Worcester, Mass.

NORTON ABRASIVES

W-904

YOU CAN



WORLD'S MOST POWERFUL *is this G-E one-million volt industrial x-ray unit. Mounted on a traveling overhead bridge crane, this unit provides unusual flexibility to expedite the handling and radiography of large castings of various metal thicknesses—from one inch on up. Fast, safe, shockproof, it is but one unit of the complete line of G-E Industrial X-Ray apparatus.*

Save Time. Insure Quality. Cut Rejects.

Here's How G-E X-Ray Can Help You

G-E X-Ray offers you a complete line of shockproof, climate-proof industrial x-ray apparatus — with a full range of power of up to and including one-million volts — in a wide variety of types to meet every requirement. It also offers you the services of its corps of experienced industrial x-ray engineers who will help you select just the right unit and method to meet your particular need.

Thus, if you manufacture munitions and material vital to victory, and you require x-ray in your inspection facilities, G-E X-Ray offers you an unbeatable combination of experienced men and thoroughly-tested machines. It's a combination that you can rely on to *save time*, *insure quality*, and *cut rejects*.

G-E X-Ray men and machines will help you

SAVE TIME because G-E Industrial X-Ray Engineers — first to apply x-ray to industrial inspection more than 20 years ago — have an intimate knowledge of modern manufacturing methods and problems. There will be no guesswork about their recommendations; they'll give you facts and figures that you can rely on.

G-E Industrial X-Ray Units are plus-powered to provide fast, accurate x-ray service. Their full flexibility saves priceless operating time, and their controls are easy to operate accurately. Unlike ordinary x-ray apparatus, G-E Industrial X-Ray Units are designed and built to withstand the rigorous service expected of heavy industrial apparatus. And they'll take heavy duty cycles in their stride hour after hour, day in and day out. Whatever your x-ray need, there's a G-E unit that will take care of it best.

G-E X-Ray men and machines will help you

INSURE QUALITY because, with a G-E Industrial X-Ray Unit in your plant, you can gain the benefits of using x-ray as a guide to the development and control of improved casting techniques. An important item when you consider that improved techniques have resulted in doubling the yield from a single melt, and reducing to almost nothing the cost of replacing defective castings not quite up to standard. Quality is far more important today than ever before — and you can insure it without sacrificing production time when there's a G-E X-Ray Unit on the job.

G-E X-Ray men and machines will help you

CUT REJECTS because with a G-E Industrial X-Ray Unit you have available a reliable guide for the repair, by welding, of large expensive castings. While a single fault in the internal structure of the metal may render an expensive casting unfit for the particular use for which it was designed — the fact that you find the flaw is not a signal for discard! The x-ray film that reveals the flaw is also an accurate guide to its repair.

There are sound reasons why the majority of the nation's leading industrial concerns who use x-ray inspection have selected G-E Industrial X-Ray apparatus — reasons that you will be interested in. To get complete information about G-E Industrial X-Ray Units, call in an experienced G-E Industrial X-Ray Engineer to help you apply x-ray to your problem.

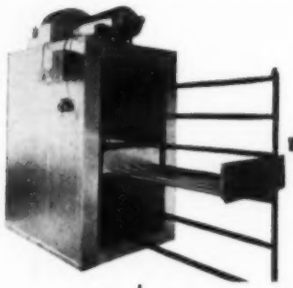
To request the services of G-E Industrial X-Ray Engineers, write or wire, today. Address your request to General Electric X-Ray Corporation, 2012 Jackson Boulevard, Chicago, Illinois. Department N33.

Films, Film-Processing Chemicals, Screens, Cassettes, and other accessories to make G-E's the world's most complete single-source x-ray supply line—available from 35 direct factory branch offices.

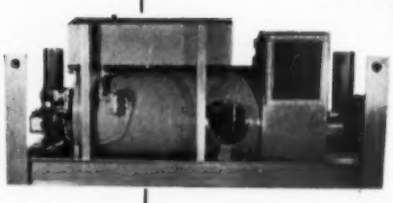
GENERAL ELECTRIC X-RAY CORPORATION

PORBECK VERTICAL-LIFT CORE OVEN
Air Re-Circulating Principle

Uniform Cores at TOP SPEED!



PORBECK
DRAWER TYPE
CORE OVEN



PORBECK
PORTABLE
MOLD
DRYER

★

This two-unit, all-purpose vertical lift oven is a typical Porbeck installation.

Ovens are available in a wide range of sizes, oil or gas fired, with fully automatic temperature control and safety flame protection.

If you have small or large cores or molds and want top performance with economy year after year, consult us. You will be assured of obtaining the latest developments in foundry core baking and mold drying equipment.

PORBECK MANUFACTURING CO.
Industrial Oven Builders for Three Generations
2600 N. 9TH STREET ST. LOUIS, MISSOURI

PORBECK OVENS & MOLD DRYERS

This advertisement is one of a series appearing regularly in national periodicals, farm publications, and prominent city newspapers. Reprints in full color are available for your use. Write us for them.

Reproduced from a full-color painting by Douglass Crockwell for Republic Steel.

"Now . . . if I was down there in Washington . . ."

That's Joe talking. Every night when he stops in for his coffee and sinkers he has plenty to tell the boys about how this war should be run. Maybe he's right and maybe he isn't.

The important thing is that he can say what he thinks—out loud. Right in front of Tom Burke, the cop. He couldn't do that in Germany or Japan or Italy . . . or in any of the nations that have been "liberated" by the New Order.

But Joe is an American.

★ ★ ★

And because Joe is an American, he has more privileges—*and more opportunities*—than can be found anywhere else in the world.

If he doesn't want to work for somebody else, he can operate a business of his own—anywhere. Joe is a free agent. His future is under his hat. Like millions of other Americans on the way up, Joe can cash in on a way of life that has brought America the highest standards of living in the world—by a big margin.

It is a typically *American* way of life—based on American ingenuity, ambition, desire to get ahead. It gives every person a chance.

That is why today, after a comparatively short time, teamwork and cooperation in American industry and American agriculture are performing miracles of production that would be impossible in a country weakened by years of regimentation and dictatorship.

That is why the steel industry—in which Republic holds a leading position—has been able to "come through" with the steels and steel products for our Nation's gigantic armament and shipbuilding programs. In 1942 Republic operated at 99.5% of capacity for the entire year. And the nearly 70,000 Republic men and women supporting our fighting forces* beat the 1941 record by 479,000 tons.

That, too, is why Republic chemists, metallurgists and engineers are constantly searching for—and finding—new and improved ways of making finer steels.

And that is why you can look with faith to the future—when victory will insure our *free* way of life—when you and we can return to the job we want to do most—produce peacetime products to make America a better, happier, safer place in which to live.

Until then, we have a big job to do. LET'S DO IT WELL and get it finished in a hurry. And let's guard faithfully our American way of life!

**Over 13,000 Republic men are now in uniform.*

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, N. Y.

Republic

PIG IRON ("CHATEAUGAY" • "REPUBLIC" • "PIONEER")

Truscon Foundry Flasks, Republic Core Wire, Foundry Nails.

HAYNES *equipment*

BRASS FURNACES

Tilting or stationary. Simple cover lifting mechanism, 2" cold rolled shaft, cast steel cross head, 3/8" rods and turnbuckles for adjusting cover. Made in any size required. 6" machined trunnions rest in chilled face bearings in the legs which are bolted to channel iron base braced with steel bars to eliminate side motion. Gear box and gears adjustable to take up any loose play due to wear. Furnace is complete welded shell equipped with special Haynes burner designed to save nearly one-fourth your oil. Equipped with a General Blower unit.

JOLT SQUEEZER

This machine has a 10" squeeze cylinder, 3" jolt cylinder, 17" x 20" jolt table. Sturdily built throughout—no bolts or screws. Post and jolt cylinder cast in one piece. Arm swings on 2-7/16" cold rolled shaft. Zerk fittings on all moving parts. Comes completely equipped with vibrator, riddle rack, set-off board, air gauge, pop-off gauge and pin for gate horn.

WORM GEAR LADLES

Haynes Worm Gear Ladles are manufactured in all sizes. Welded bowls, cast steel trunnions with "V" bail. Gears completely enclosed. Zerk fittings on all moving parts. Bail is made from 3" x 1" steel.

CORE OVENS

The Haynes Core Oven has 2" insulated walls. Front, top and bottom pressed steel eliminating breakage. Cast iron fire box for Coke, Oil or Gas. Five rolling shelves, one 10" high and four 7" high. Shelves make complete half turn closing oven while shelves are being loaded. Height 51", width 54", greatest depth of shelf 27". Weight approximately 900 lbs. Firebox height 16", depth 15", width 14".

Send for detailed information and prices. Prompt deliveries.

HAYNES FOUNDRY EQUIPMENT CO.

1734 LAKE STREET **KALAMAZOO, MICH.**

HARD CHROME PLATED

For Better Production!

Hard Chrome Plated pneumatic tools will out-wear unplated tools two to three times. This fact has been proved by our customers, whose enthusiastic recommendation of our method of Plating pneumatic tools has been a source of pride to us for many years. Master Chipping Hammers and Sand Rammers, specially designed for the foundry industry, are the result of years of experience with Hard Chrome Plate in the rebuilding of pneumatic tools. Master Chippers and Rammers, Hard Chrome Plated for longer wear, are guaranteed for long life and sustained performance. Their use assures more efficient work and higher production, due to their ease of operation.

Master SAND RAMMERS

The Master Sand Rammer, a fast and hard hitting tool, meets the highest requirements of the Foundry industry. Used for mold and pit ramming, the efficiency of this tool improves the quality and uniformity of the castings. The inside cylinder wall of the Master Rammer is Hard Chrome Plated, guaranteeing longer life. This Sand Rammer contains the Master Self Seating Valve Box, so simple in design that repair costs for this usually expensive part are all but eliminated. Minimum vibration and perfect balance insures easy operation.

Master CHIPPING HAMMERS

The Master Chipping Hammer, manufactured in 1″, 2″ and 3″ stroke, has proven to be an outstanding performer in billet and sand chipping, finish chipping, chipping of welds, beading, calking, and scaling. Like the Master Sand Rammer, the cylinder is Hard Chrome Plated and the Chipper also contains the Master Self Seating Valve Box. Operators appreciate the improved grip of the Master Chipper, which gives it perfect balance. Special recoil cushioning makes it the smoothest tool of its kind for the power it develops.

"The Master of Them All"

MASTER TOOL CO. INC.

5605 HERMAN AVE. • CLEVELAND, OHIO

For Further Information, Write for Catalog.

HEADLINES DON'T TELL THE WHOLE STORY

Maybe you'll never see a headline like this, but wartime demands for better cores and lots of 'em make many old core ovens bite the dust. They're KO'd for keeps!

The plain fact about these casualties is that core-baking isn't a hit-or-miss business any more—it's a real science and plenty technical.

Yesterday you baked a load of cores 12 to 36 hours. Then you dumped out half of them as rejects due to poor baking—some burnt like a bride's biscuits, others green as sour apples. The trouble was—no heat control.

But in Despatch ovens this *can't* happen. Heat and airflow are *forced* to toe the line, so every core in the load gets the same even baking.

I know this is true because I see it happen all the time—foundries saving up to 70% processing time with Despatch ovens—batch after batch of cores baked perfectly . . . and rejects? they're as scarce as hen's teeth.

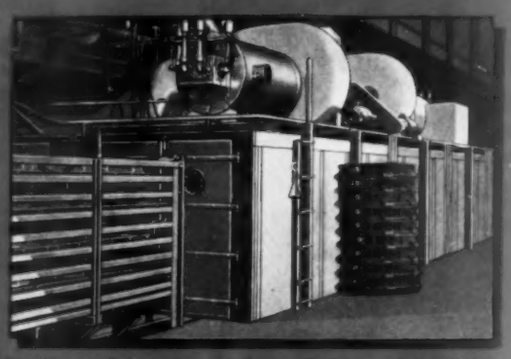
FOR RAPID, EVEN BAKING every time, inquire about Despatch ovens first. Get full details about types shown here; also many others.

WRITE, PHONE OR WIRE for prompt assistance.

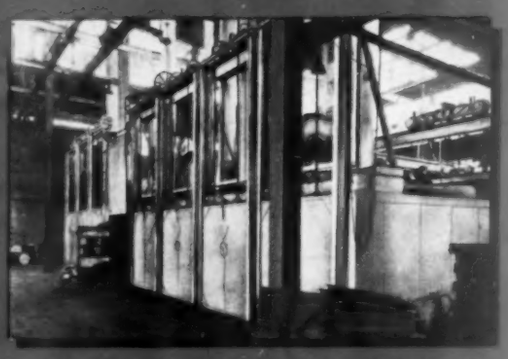
CALL A DESPATCH ENGINEER TODAY!

DESPATCH
OVEN COMPANY MINNEAPOLIS

Use Despatch vertical type core oven for large output with limited floor space.

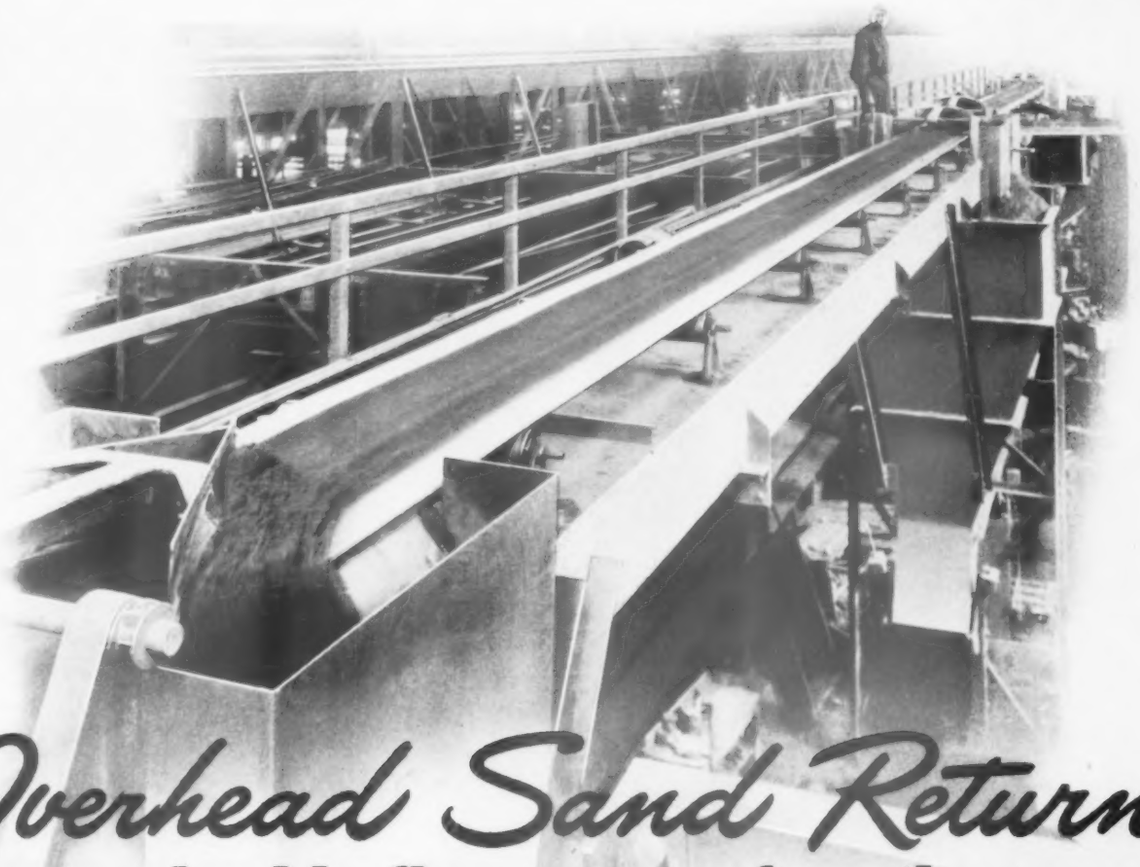


Use Despatch tunnel ovens for continuous or intermittent core production lines.



Use Despatch batch type core ovens for production of all sizes of cores.

Use Despatch drawer-type core ovens for smaller cores requiring frequent loading and unloading.



Overhead Sand Return
saves valuable floor space for other work

• Bartlett-Snow Overhead Distributing Systems for returning tempered sand to the molders permit a much more orderly and more profitable operation than would otherwise be possible.

For Belt Distributing Systems — usually preferred when sand is to be distributed to a relatively small number of large hoppers such as those used with flask fillers, etc. — Bartlett-Snow has developed a special design of troughing and flat carrying idlers specially for foundry service. The discharge is effective with either one-way plows which divert the sand to one side only, or the larger capacity two-way plows. Both types are designed to minimize belt wear.

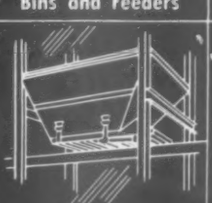
Flight Distributing Systems, used preferably for filling a long row of small molders hoppers, or to avoid the spillage sometimes encountered from the return run of a belt distributor, drop the sand into the molders hoppers through openings in the bottom of the trough — and can be arranged to carry sand in both directions if desired.

Our recently issued 40-page Foundry Bulletin No. 91 illustrates many different Distributing Systems and other Bartlett-Snow Foundry Equipments. Copies are available on request.

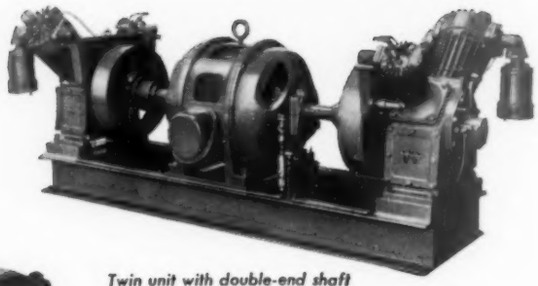
THE C. O. BARTLETT & SNOW COMPANY
6201 Harvard Avenue **Cleveland, Ohio**
Engineering and Sales Representatives in the Principal Cities

BARTLETT-SNOW
ENGINEERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

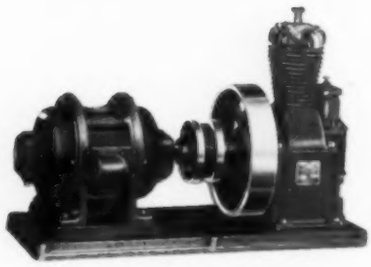
Complete Sand, Mold and Castings Handling Equipment for any requirement, including

Shakeouts	Elevators	Aerators	Sand Distributors	Bins and Feeders	Apron Conveyors	Dust Collectors
						

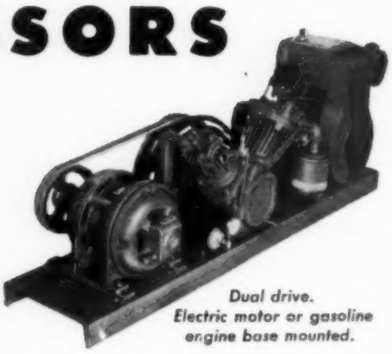
WORTHINGTON Vertical COMPRESSORS



Twin unit with double-end shaft motor on steel base



Unit direct connected to electric motor



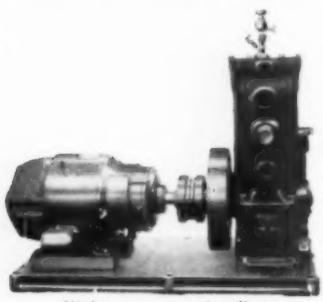
Dual drive. Electric motor or gasoline engine base mounted.

24 Sizes

344 Arrangements

Capacities to 164 c.f.m.

Pressures to 1000 lbs.



High-pressure unit direct connected to electric motor

War production plants are now using these units in a total of more than two million horsepower. To any plant whose needs for compressed air fall within the above range, Worthington compressor equipment offers advantages that can contribute greatly to stepped-up output. They are built for users who demand the best equipment.

Tank-mounted belted unit showing pressure regulator control

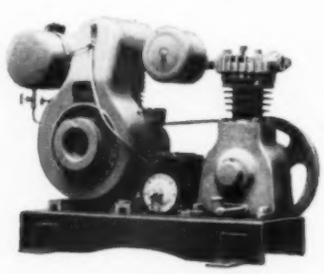
The following features make Worthington compressors the choice of careful purchasers.

- One-piece Feather Valve . . . lightest, simplest, most efficient.
- Close-grained nickel iron cylinder, honed to mirror surface . . . generously finned for efficient cooling.
- Ground piston, closely fitted in cylinder . . . two compression rings and two oil rings . . . for oil-free air discharge.
- Full-floating wristpin . . . retainer spring prevents scored cylinder.
- Extra-long drop-forged heat-treated connecting rod . . . reduces cylinder wear. Shim-adjusted babbitt crankpin bearing. Graphite-bronze wristpin bushing.
- Drop-forged heat-treated integrally-counterbalanced crankshaft . . . journals ground and polished.
- Adjustable Timken main bearings . . . controlled splash lubrication.
- Force-feed lubrication to all shaft bearings . . . adjustable babbitt main bearings.
- Shaft oil-seal keeps compressor installation clean and oil-free.
- Crankcase ventilator . . . well baffled . . . keeps oil in, and dust out.
- Cast-iron belt wheel with fan spokes . . . good cooling decreases power required.

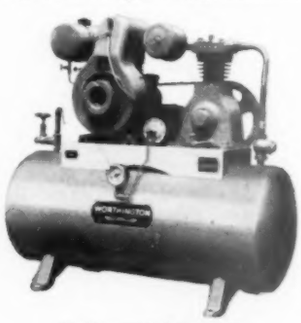
Worthington vertical compressors are available to those manufacturers whose war production activities give them priority. An authorized Worthington industrial dealer or district office engineer will be glad to assist you with the correct selection for your requirements.

Unit mounted on Massachusetts code vertical tank

Massachusetts code horizontal tank-mounted compressor unit



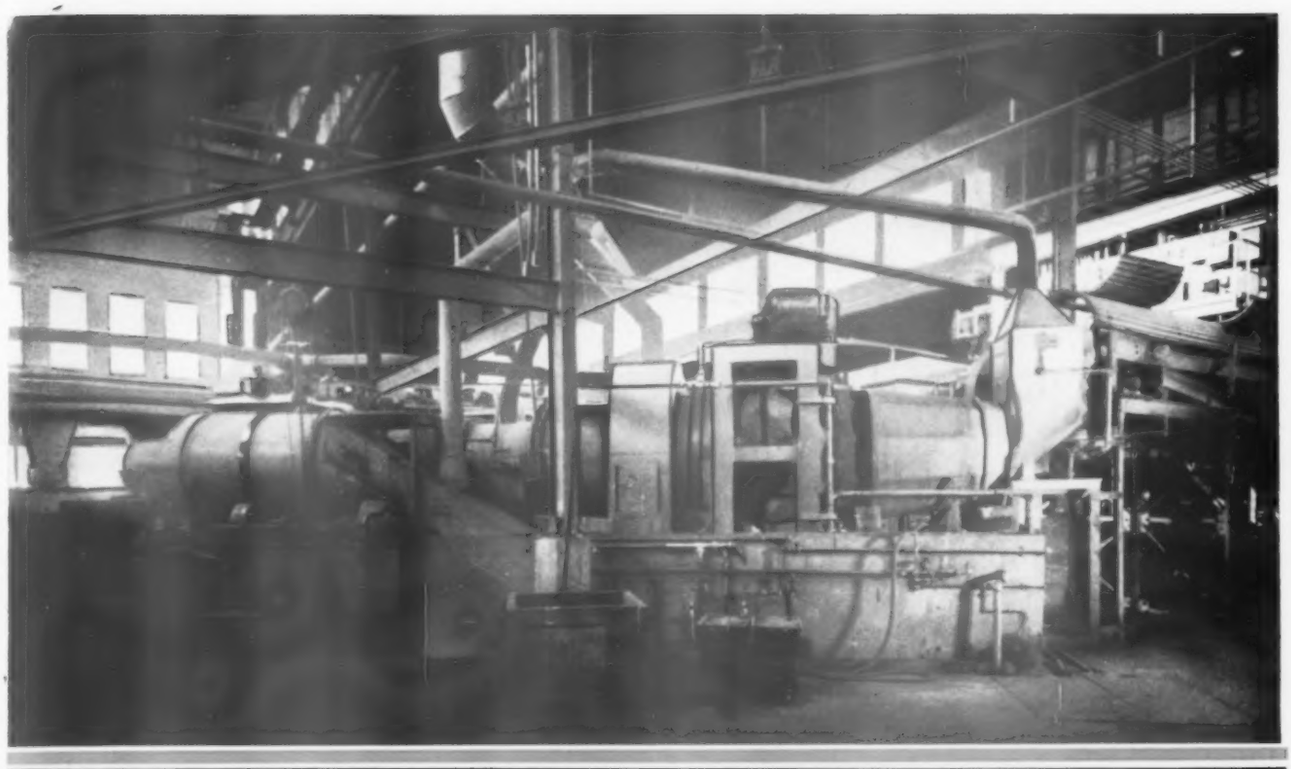
Base-mounted unit with gasoline engine drive



Tank-mounted unit with gasoline engine drive

AC3-1

WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY



RANSOHOFF *Automatic Star-Return* TUMBLING MILLS

GOOD *and* BIG

WORK DONE QUICKLY, 100% EFFICIENTLY

CAPACITY TURNING OUT

64 TONS EVERY 8 HOURS

60" x 84" END-LOADING, END-UNLOADING WET MILL with cooling conveyor from the shake-out. Conveyor collects a complete batch of work which is fed into the tumbling mill. After cleaning, work is discharged into the holding and feeding drum which feeds it at a uniform rate onto a sorting conveyor. Cooling conveyor and mill are equipped with time switches so that *entire equipment functions automatically* without labor. *Machine photographed is handling malleable pipe fittings before annealing.*

AUTOMATICALLY CONTROLLED FROM SHAKE-OUT TO SORTING CONVEYOR

Eliminates manual handling—saving time and labor

THE RANSOHOFF METHOD—Castings cascade in a mass in which stars are intermingled thoroughly. All voids are filled completely. Stars vary in size and shape. Results: very rapid cleaning without nicking, breaking or excessive wear on mill lining. Stars enter and return automatically. Replacement costs are at a minimum. Wet method eliminates dust and dust collectors, reducing health hazards.

RANSOHOFF TUMBLING MILLS
speedy . . gentle . . stars are handled automatically throughout

Write the RANSOHOFF ENGINEERS for solution of your tumbling problems.

N. RANSOHOFF, Inc.

CINCINNATI, OHIO
Township Ave. and Big 4 R. R.

MOLDING MACHINES

designed for

QUALITY, QUANTITY, AND CONSISTENCY

No. 11 Type J.S.
Heavy Duty Jolt Stripper
11" Jolt Piston—9" Draw
Weight—5200 lbs.

We have designed two new jolt stripper machines to handle flasks from 21" to 29" in width. Open end frame makes this machine flexible. Pattern changes can be made in a few minutes.

After jolting machine draws up and mold is completed. Hard jolt and fast accurate draw insures fast production and quality castings. Simple, rugged design insures consistent production and minimum maintenance.

Perfect alignment and draw is assured with these six (6) long pins and bushings, hardened and ground to a precision fit.

The principle of operation is the same as our Heavy Duty Type "D" excepting that this Jolt Stripper has no squeeze.

The principal part of this machine, the heavy base and cylinder is made of our special formula high tensile semi-steel and is cast in one (1) piece, not a number of small parts bolted together.

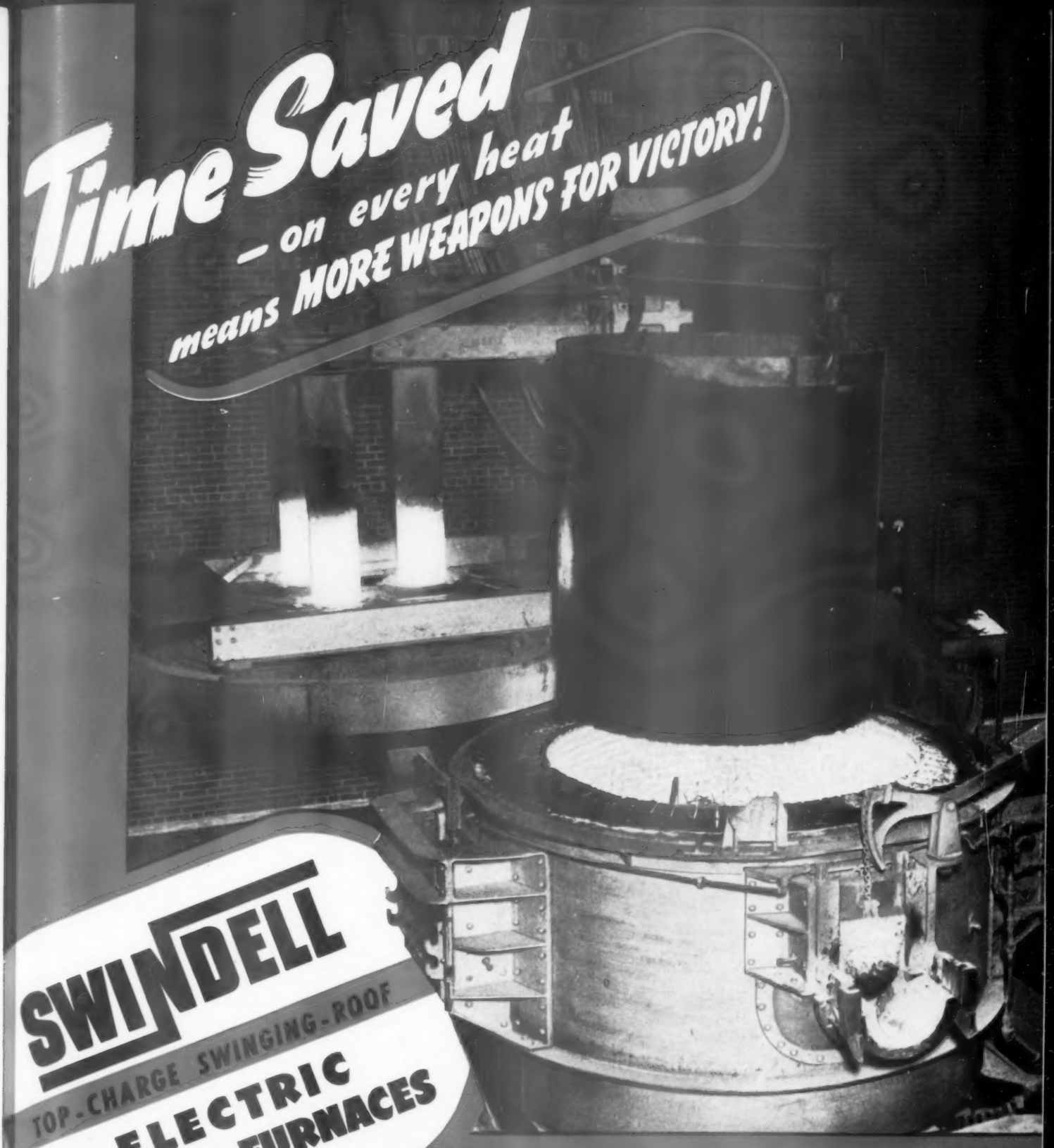
Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

ESTABLISHED 1910

Foreign Manufacturers and Selling Agents—

For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland.

NICHOLLS



SWINDELL

TOP-CHARGE SWINGING-ROOF

ELECTRIC MELTING FURNACES

● *In action* more hours every day and night, pushing "capacity" to new high levels, Swindell Swinging-Roof Furnaces save many minutes on every charge—*golden minutes which buy more steel!* Top-Charging speed is matched by exclusive Swindell construction advantages—integrated for consistent smooth performance.

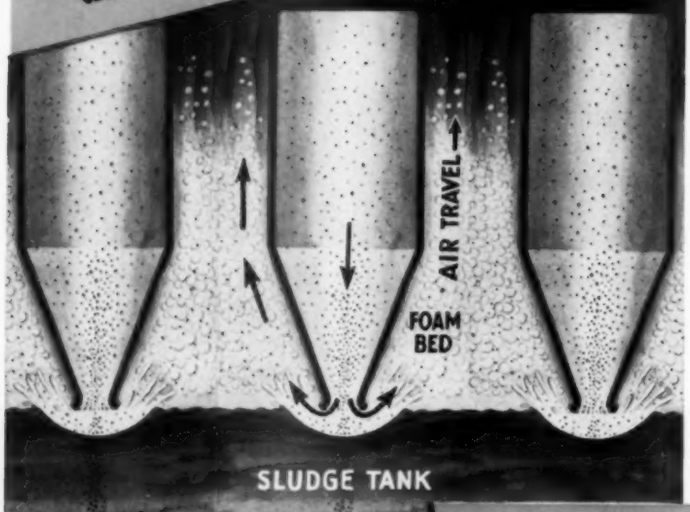
SWINDELL-DRESSLER *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH, PA.

MAHON *Hydro-Foam* DUST COLLECTORS

Remove the DUST from INDUSTRY and Deposits it Under Water

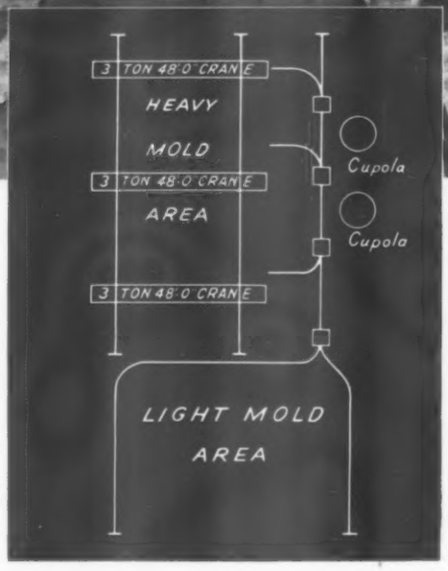


● The Mahon *Hydro-Foam* Dust Collector offers to industry an exceptionally effective and economical means of dust collection and removal. It is entirely *automatic* in operation—a completely pneumatic system that deposits all forms of harmful dust *under water* without the use of spray nozzles, pumps or cloth screens. Thus, there is nothing to clog or get out of order. Having no moving parts, other than the suction-exhaust fan, wear and replacement are negligible. Mahon *Hydro-Foam* Dust Collectors are today in extensive use in practically every industry where dust impedes production or is a menace to employees' health. Let Mahon engineers show you how *effectively* and *inexpensively* this advanced method of dust control is serving under conditions equivalent to your own—and why it is winning such enthusiastic approval from users.

THE R. C. MAHON COMPANY
DETROIT ● CHICAGO

MAHON

PAID
IN LESS THAN ONE YEAR



FOUNDRY SYSTEM SPEEDS PRODUCTION . . . and PAYS for itself

A careful check of all costs revealed that the entire Cleveland Tramrail materials handling system in the foundry shown above paid for itself in less than one year.

Because the equipment speeded production and improved plant efficiency, costs were lowered considerably. The savings thus effected more than paid for the system the first year.

The equipment is of the hand-propelled type and includes three 48-foot cranes, a 200-foot runway and other trackage, switches, hoists and carriers.

The cranes serve the heavy mold area. Hot metal is conveyed directly from cupolas to molds in this section. In the light mold area the metal is transported on the overhead rail system and transferred into hand pouring ladles for distribution.

Hundreds of foundries are speeding production and profiting from installations of Cleveland Tramrail.

GET THIS BOOK!

KLET No. 2008. Packed with valuable mation. Profusely illustrated. Write ee copy on your company letterhead.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

A *Real* INVESTMENT FOR MORE PRODUCTION!

DIAMOND FLASKS

No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

- **A SUPERIOR LATCH (exclusive)**

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

- **A PATENTED HINGE (exclusive)**

  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

To the FOUNDRYMEN of tomorrow

The basic materials in core sand and molding sand mixtures are

SILICA GRAINS
BOND
MOISTURE

Each of these basic materials is necessary and vitally important.

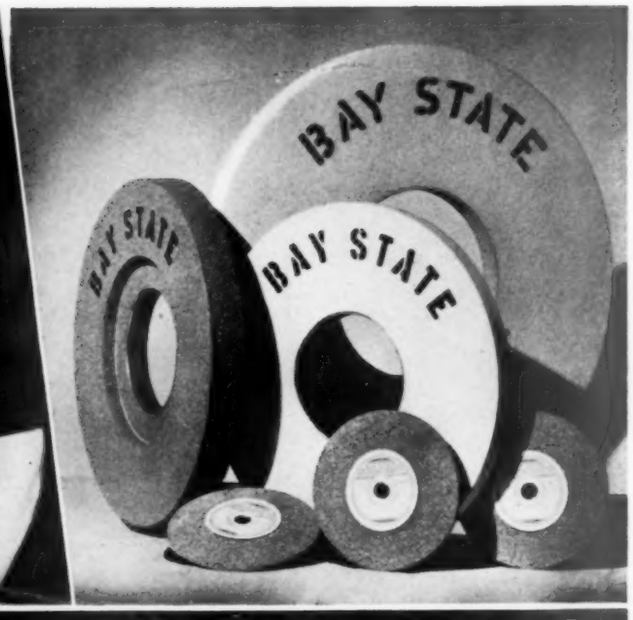
The proper combination of Silica Grains, Bonds and Moisture makes a sand mixture that will perform well throughout the entire temperature range, from room to pouring temperature.

Produce smooth castings and eliminate defects with good sand mixtures.

There's a McCormick Bond for every job.

J. S. McCORMICK COMPANY
25th STREET and A. V. R. R.
PITTSBURGH, PA.

LION BINDER — MOREBOND — EASY CLEANER CORE COMPOUND



THEY'RE DOING A "SWELL" JOB!

. . . and "hats off" to women operators like these and thousands of others who have stepped into industry to help fight this war!

Our superior allied battle-front action is dependent to no little degree on the skill and courage of our women on the production line. Long will we remember their great contribution.

BROACH GRINDING

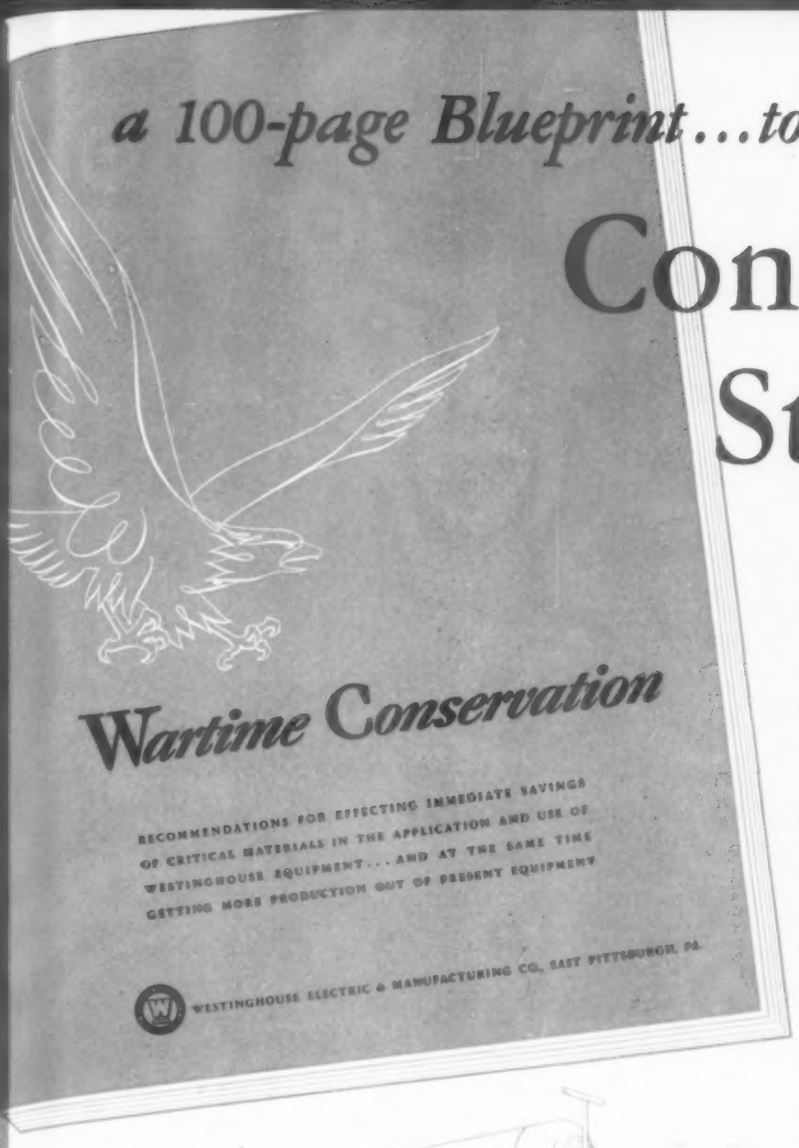
Photos courtesy of LaPointe Machine Tool Co.

BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

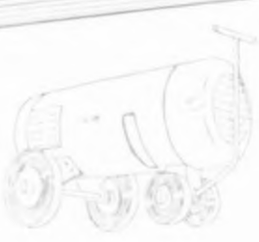
a 100-page Blueprint...to help you plan your

Conservation Strategy


Wartime Conservation
RECOMMENDATIONS FOR EFFECTING IMMEDIATE SAVINGS OF CRITICAL MATERIALS IN THE APPLICATION AND USE OF WESTINGHOUSE EQUIPMENT... AND AT THE SAME TIME GETTING MORE PRODUCTION OUT OF PRESENT EQUIPMENT
WESTINGHOUSE ELECTRIC & MANUFACTURING CO., EAST PITTSBURGH, PA.

THIS BOOK CONTAINS DEFINITE RECOMMENDATIONS...

- **From generator to motor...** Critical Material savings in selection, application and use of electrical equipment.
- **On the production line...** New methods of speeding production made possible by Westinghouse developments.
- **Keep 'em running!** Maintenance and repair service as an aid to production.
- **Replacement—not substitution...** Micarta and Prestite are superior to the Critical Materials which they replace.
- **All in the day's work...** How Westinghouse is saving Critical Materials in its own manufacturing operations.



We no longer are "too rich" to worry—the Axis has more Critical Materials than we do.

To help America save Critical Materials . . . to assist industry in planning its conservation strategy, Westinghouse has published an authoritative 100-page book. It contains recommendations for effecting immediate savings of Critical Materials in the selection, application and use of electrical equipment . . . and at the same time getting more production from present equipment.

Write for your copy today (company letterheads, please!). Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-90461

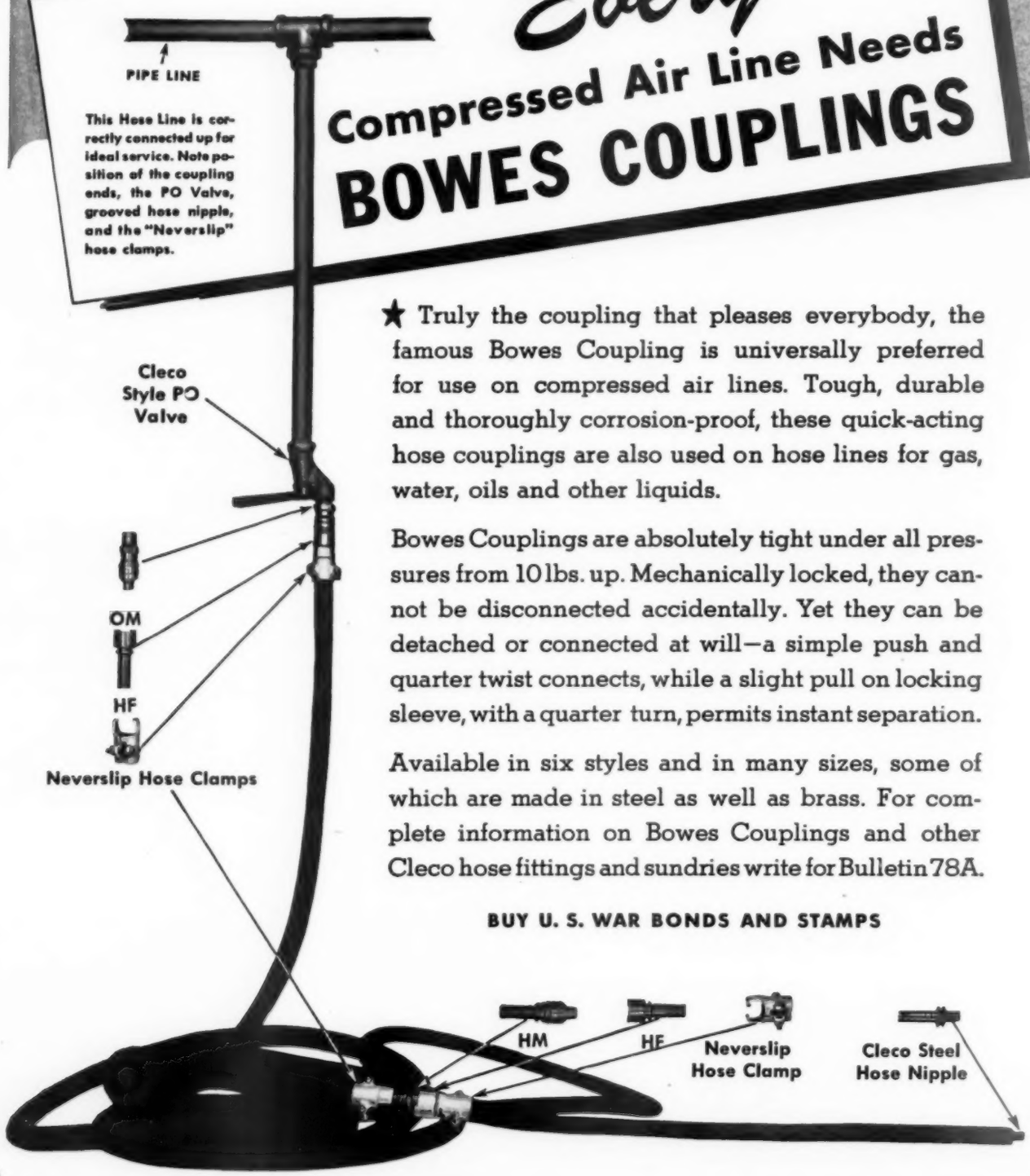
Comparison of United Nations and Axis resources prior to war and today

	Before the war		*Now*	
	United Nations	*Axis*	*U. Nations*	*Axis*
STEEL	73%	27%	50%	50%
COPPER	94%	6%	83%	17%
TIN	99+%	1–%	35%	65%
ALUMINUM	68%	32%	42%	58%
PIG IRON	75%	25%	44%	56%
TUNGSTEN	95%	5%	65%	35%
MAGNESIUM	44%	56%	32%	68%

Westinghouse

PLANTS IN 25 CITIES ...OFFICES EVERYWHERE

Every Compressed Air Line Needs BOWES COUPLINGS


PIPE LINE
This Hose Line is correctly connected up for ideal service. Note position of the coupling ends, the PO Valve, grooved hose nipple, and the "Neverslip" hose clamps.
Cleco Style PO Valve
OM
HF
Neverslip Hose Clamps
HM
HF
Neverslip Hose Clamp
Cleco Steel Hose Nipple

★ Truly the coupling that pleases everybody, the famous Bowes Coupling is universally preferred for use on compressed air lines. Tough, durable and thoroughly corrosion-proof, these quick-acting hose couplings are also used on hose lines for gas, water, oils and other liquids.

Bowes Couplings are absolutely tight under all pressures from 10 lbs. up. Mechanically locked, they cannot be disconnected accidentally. Yet they can be detached or connected at will—a simple push and quarter twist connects, while a slight pull on locking sleeve, with a quarter turn, permits instant separation.

Available in six styles and in many sizes, some of which are made in steel as well as brass. For complete information on Bowes Couplings and other Cleco hose fittings and sundries write for Bulletin 78A.

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND PNEUMATIC TOOL CO.
3781 EAST 77th ST. *Branch Offices in All Principal Cities* CLEVELAND, OHIO
★

NEWS

of major importance to all foundrymen

AQUA-SET

a synthetic core binder

The most remarkable thing about AQUA-SET is the fact that DRYING TIME is also BAKING TIME. Just enough oven heat to thoroughly dry the cores will complete the bake. This can save hours on a normal baking cycle. AQUA-SET can be used to produce cores with a hard top surface and a softer or sandy center; they will pour from the finished casting like sand. AQUA-SET has a special value for aluminum and magnesium through its reaction in a low oven and its fast collapse on pouring. In a very few words, AQUA-SET can be described as follows: HARDER SURFACE, SMOOTHER FINISH, SOFTER CENTER, FASTER COLLAPSE, LOW GAS, STRAIN-PROOF CASTINGS—and the *value of baking cores thoroughly in half the normal oven time.*

UNITED OIL MFG. CO., 1429 WALNUT ST., ERIE, PA.

Make Your Selection From This List

SIDE ROD TYPE — Portable or Stationary

	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw, Adjustable
10″-32″ Jolt Squeezer	10″	4″	32″	
12″-38″ Jolt Squeezer	12″	5″	38″	
16″-42″ Jolt Squeezer	16″	6″	42″	
10″-32″ Universal Jolt Squeezer	10″	4″	32″	3″ to 6″
12″-38″ Universal Jolt Squeezer	12″	5″	38″	3″ to 6″

Also Adams Hand Squeezers — 30″, 34″ or 38″ between side rods — Portable or Stationary.

THE ADAMS COMPANY

MOLDING MACHINES · FLASKS

Adams Molding Machines

POST TYPE—Portable or Stationary

	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10″ Post Type Jolt Squeezer	10″	4″	
12″ Post Type Jolt Squeezer	12″	5″	
10″ Post Type Universal Jolt Squeezer	10″	4″	3″ to 6″
12″ Post Type Universal Jolt Squeezer	12″	5″	3″ to 6″

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.

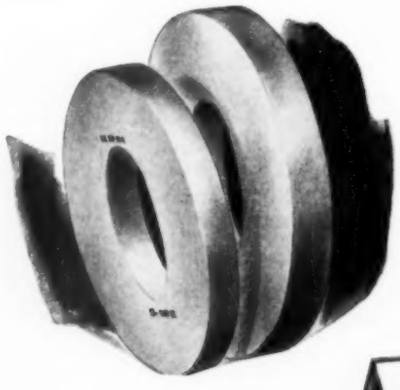
PNY · DUBUQUE, IOWA · U.S.A.

SK EQUIPMENT Established 1883

What's the hottest spot in a Dog Fight ?

A pilot may keep cool in a "dog fight"—but not his engine! And to function smoothly at high engine temperatures all moving parts must be ground and finished with split hair precision. And that's where Carborundum comes in. For instance, the valve stems are ground to the required accuracy by a centerless grinding process which Carborundum helped develop.

The centerless grinder grinds the valve stems to an accuracy of five ten-thousandths of an inch. Does it, too, in half the time other finishing methods would require. Carborundum has led in the development of centerless grinding wheels to speed the output of valves, pistons, shafts and other such parts that go into a plane.



Because of the vital part grinding plays in war production, correct care and use of grinding equipment is a wartime must. Every grinding wheel is a "Weapon for Production" and should be properly used for maximum effectiveness. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

OHIO FERRO-ALLOYS

... vital to the performance of the
National Emergency Steels
that will bring Victory many steps
nearer during this crucial year

DEPENDABILITY • PHILO BRAND • QUALITY • SERVICE

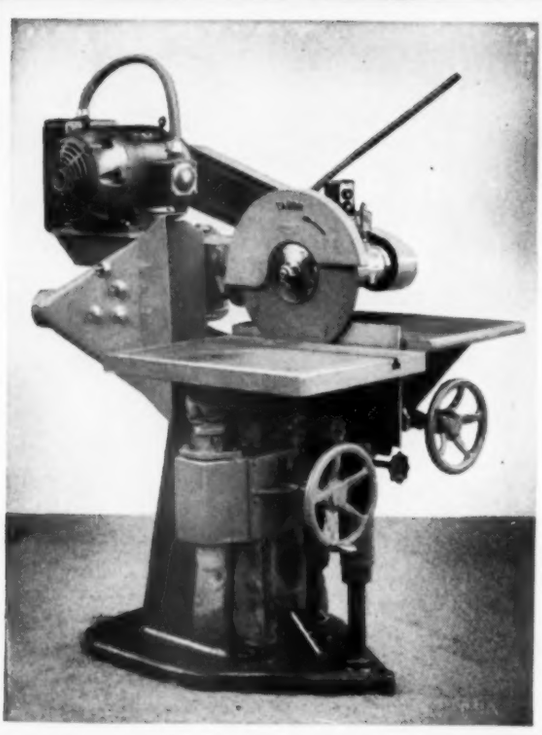
DEPENDABILITY • RAINIER BRAND • QUALITY • SERVICE

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh Tacoma

Save PRICELESS TIME with the . . .

TABOR-BRASIVE CUT-OFF MACHINE



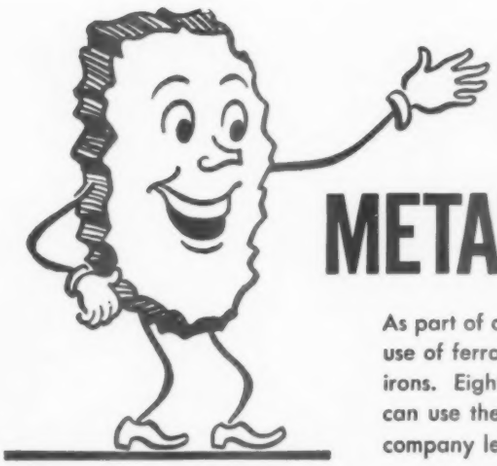
The above-all need of the day is high and ever higher production. Between pouring and shipping no time can be lost . . . and none need be.

A Tabor-Brasive Cut-Off Machine will more than keep pace with your increased production schedules. It will cut gates and risers from castings of manganese bronze, aluminum bronze, nickel, monel and other tough-cutting metals in a matter of seconds—unbelievably fast. Cuts are clean and close to the casting—snagging and finishing grinding are reduced to a minimum, often entirely eliminated.

Write for information, giving details of your cutting problems. There is a Tabor-Brasive Cut-Off Machine of a size and type to meet your requirements.

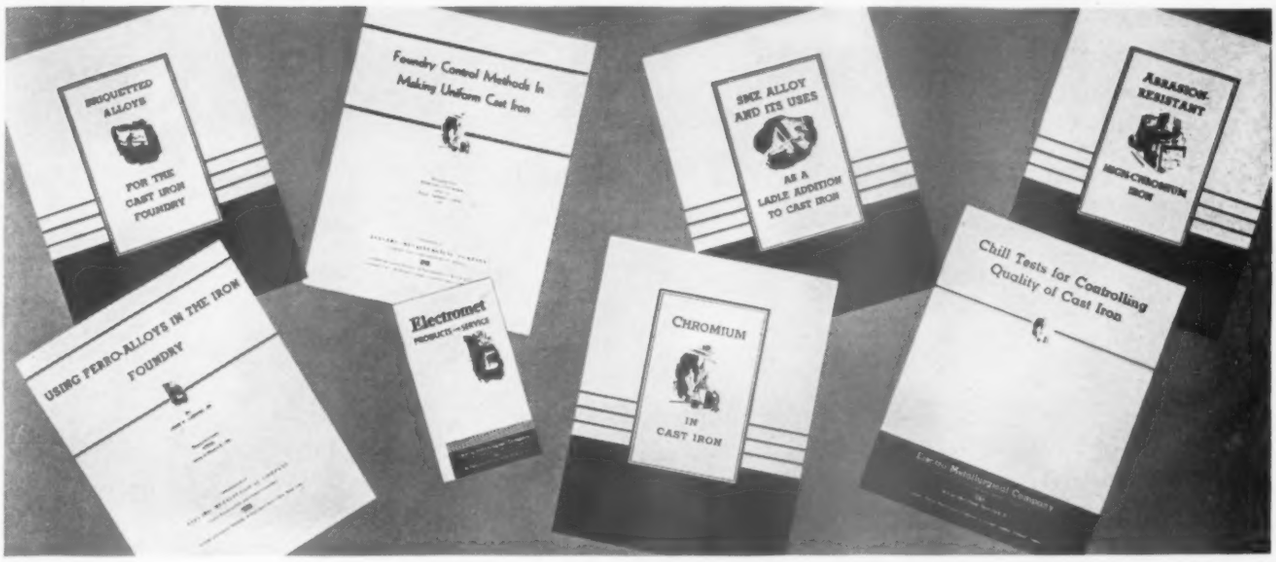
THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: *Los Angeles, Calif.*, Snyder Foundry and Supply Co.; *Oakland, Calif.*, Pacific Graphite Co.; *Seattle, Wash.*, Carl F. Miller & Co.



Help Yourself To METALLURGICAL Information

As part of our service to the foundry industry we publish literature describing the use of ferro-alloys in the foundry, and the advantages and applications of alloy irons. Eight booklets from our literature library are briefly noted below. If you can use the information supplied by any of these booklets, write for it on your company letterhead. Please refer to the form number in your request.


BRIQUETTED ALLOYS FOR THE CAST IRON FOUNDRY
Foundry Control Methods In Making Uniform Cast Iron
SMZ ALLOY AND ITS USES AS A LADLE ADDITION TO CAST IRON
ABRASION RESISTANT HIGH-CHROMIUM IRON
USING FERRO-ALLOYS IN THE IRON FOUNDRY
Electromet PRODUCTS AND SERVICE
CHROMIUM IN CAST IRON
Chill Tests for Controlling Quality of Cast Iron

Chromium in Cast Iron gives data relating to the properties, production, and uses of chromium cast iron. A bibliography is included. 48 pages Form 2465

Briquetted Alloys for the Cast Iron Foundry explains the advantages of briquetted alloys and describes the effects of the more important alloys upon the components of cast iron. Graphs and tables serve as illustration. 16 pages Form 3465A

Abrasion-Resistant High-Chromium Iron is a general discussion of the properties chromium imparts to iron and how those properties are of service to industry. 8 pages Form 4988

Using Ferro-Alloys in the Iron Foundry discusses the effects of alloying elements in cast iron and the most satisfactory methods of adding the alloys in the foundry. 4 pages Form 3478

Chill Tests for Controlling Quality of Cast Iron defines chill tests, outlines their uses, their forms, the effects of alloys on chill depth, and the best methods of chill control. 8 pages Form 5091

Foundry Control Methods in Making Uniform Cast Iron outlines foundry-control methods now being used in making castings, particularly by the cupola process. A bibliography is included. 14 pages Form 5059

SMZ Alloy and Its Uses describes the SMZ ladle-addition alloy developed by metallurgists of Electro Metallurgical Company for improving cast iron. Tables, graphs and photographs serve as illustration. 12 pages Form 4604A

Electromet Products and Service lists the Electromet ferro-alloys and metals we produce. Each grade is described briefly, and suggestions are offered for its application in steel plants, and in both ferrous and non-ferrous foundries. 24 pages Form 2165B

• • •

Distribution of useful literature is only one part of a broad service program, which includes on-the-job advice from Electromet technical men, and an active research program in the development and specialized applications of ferro-alloys. If you have a problem in the selection or use of ferro-alloys consult Electromet metallurgists. There is no obligation.

Electromet Ferro-Alloys and Metals are available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco.

Electromet
Trade-Mark
Ferro-Alloys & Metals

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York, N. Y.
In Canada: Electro Metallurgical Company of Canada, Ltd., Welland, Ontario

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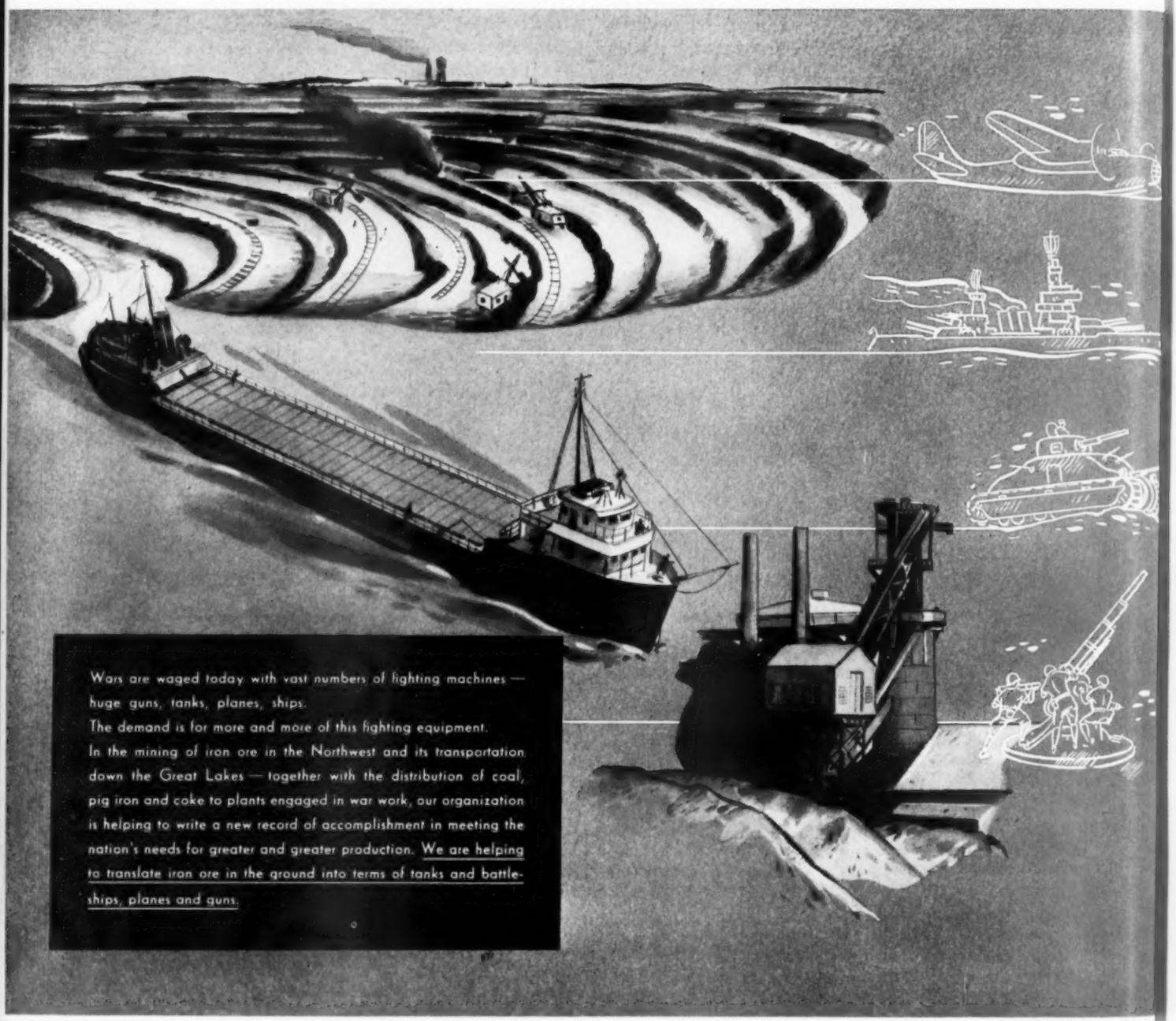
VITAL TO Victory



Wars are waged today with vast numbers of fighting machines — huge guns, tanks, planes, ships.

The demand is for more and more of this fighting equipment.

In the mining of iron ore in the Northwest and its transportation down the Great Lakes — together with the distribution of coal, pig iron and coke to plants engaged in war work, our organization is helping to write a new record of accomplishment in meeting the nation's needs for greater and greater production. We are helping to translate iron ore in the ground into terms of tanks and battleships, planes and guns.

PICKANDS MATHER & COMPANY

CLEVELAND • CHICAGO • DETROIT • ST. LOUIS • ERIE • DULUTH • MINNEAPOLIS • TOLEDO

New York—William R. Alley • Philadelphia—Carson, Marshall & Co. • San Francisco, Los Angeles and Seattle—H. L. E. Meyer Jr. & Co.

IRON ORE ★ PIG IRON ★ COAL ★ COKE

HINES GIANT *Pop-Off* FLASK

*Trademark Reg. U.S. Patent Office

Yes, Hines have developed and promoted the use of large "Pop-Off" flasks and jackets, so large in fact that they must be equipped with trunnions, truss rods and hollow sockets for pipe handles, as shown in the illustration.

These flasks, weighing approximately 150 pounds each, have saved thousands of tons of essential steel and also saved valuable man power by eliminating shakeouts. In addition, they conserve floor space and increase production immeasurably.

The following list gives some idea of the sizes which are in daily use:

$15 \times 75 \times \frac{8}{5}$	$22 \times 38 \times \frac{13}{10}$	$20 \times 42 \times \frac{11}{10}$	$22 \times 48 \times \frac{8}{8}$
$23 \times 30 \times \frac{7}{5}$	$30 \times 38 \times \frac{6}{5}$	$34 \times 34 \times \frac{6}{8}$	$36 \times 36 \times \frac{18}{17}$

MAKERS OF FOUNDRY FLASKS AND JACKETS Since 1919

HINES FLASK COMPANY

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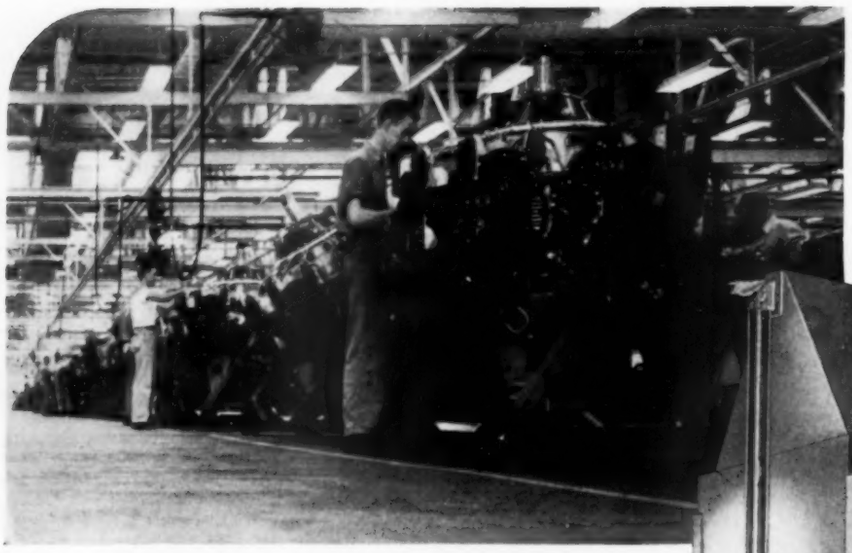


★ *Photograph courtesy Wright Aeronautical Corp.*

X-RAY EQUIPMENT

used for Inspecting Parts in CYCLONE ENGINES THAT POWER OUR FLYING FORTRESSES

KELEKET X-RAY

Available with Complete Automatic Control

With this control, the unit opens and closes the doors, moves the dollies in and out, and exposes the films at the correct intervals — all automatically.

THIS new, compact X-ray unit was designed by KELEKET engineers for inspecting light or heavy metal parts on a fast assembly line. Speed is limited only by the rate at which the dollies can be loaded and unloaded — up to 5000 small parts have been radiographed in a single 8-hour shift.

This fast, efficient X-ray inspection tool is built to operate with your present assembly line, or can be adapted to any mass production operation.

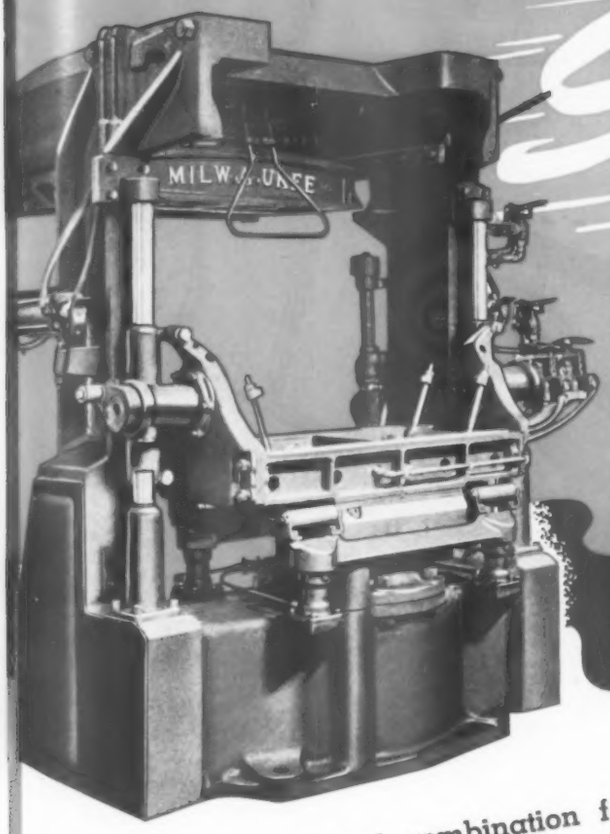
KELEKET engineers will be glad to consult with you on any problem requiring high-speed X-ray inspection and explain how this equipment can be adapted to meet your requirements and specifications.

THE KELLEY-KOETT MFG. CO., Industrial Division
2273 West Fourth Street, Covington, Ky.
Representatives in 64 Cities

PIONEER CREATORS OF *QUALITY* X-RAY EQUIPMENT SINCE 1900

Speeding VITAL WAR WORK!

. . . 70 to 80 Molds Per Hour is the Remarkable Production Record of these Faster, Foundry-Engineered Molders



FOR DRAGS — Milwaukee Jolt Squeeze Rollover Draw (in Jolting Position)

Here's the ideal combination for your war production foundry—(1) a sensational Power Rollover Machine with automatic leveling and smooth pattern draw, combining jolt squeeze, rollover and pattern draw in the simplest possible operating cycle — (2) a fast Jolt Squeezing Stripper with car suspended squeeze platen that permits fully automatic overhead mold removal. On DRAG production, the molds are discharged on a roller conveyor . . . on COPE production, the molds are automatically set on storage rollers at a height convenient for closing. Install these two machines in your foundry and you'll be helping Uncle Sam boost production for VICTORY.

FOR COPES — Milwaukee Jolt Squeezing Stripper (in Jolting Position)

ll pay you to investi-
his ideal combination.
e today for literature.

MILWAUKEE FOUNDRY EQUIPMENT CO.

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FAMOUS CORNELL FLUXES

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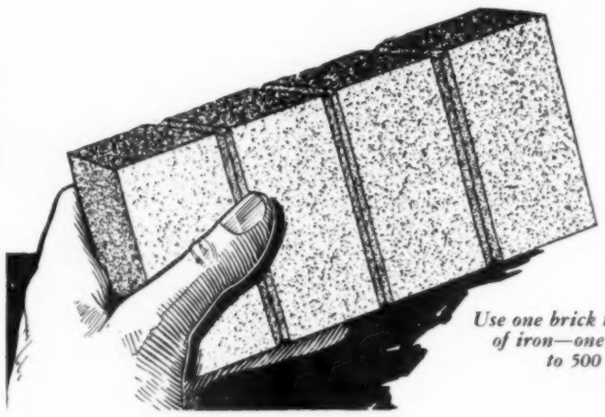


Use one brick to a ton of iron—one section to 500 pounds

NEVER More Urgently Needed or MORE SINCERELY APPRECIATED

Today foundrymen face unprecedented difficulties. **Greater production is constantly demanded—more frequent heats are necessary—there is less time for close checking—more scrap, of inferior grade must be used—yet *castings must be better than ever before.***

This situation has created many headaches—several of which are being cured by Famous CORNELL FLUX.

CORNELL *Brass* FLUX

For best possible results in producing pure, dense grained castings that withstand high pressure tests and polish beautifully.

It purges and purifies. Causes gases to rise and coat the surface with slag so essential to best melting results.

Saves fuel—keeps linings in condition—cleans dirty borings and sweepings—eliminates need for tin and other expensive metals.

Order a keg or barrel and prove these claims to your entire satisfaction.

CORNELL *Aluminum* FLUX

An unequalled aid in producing castings o highest grade.

Gives sounder castings—(thinner but stronger, if desired) that take a higher polish.

Permits using more scrap without fear of porous or spongy spots.

EMITS NO OBNOXIOUS FUMES. A keg or barrel will prove our claims and solve many of your problems.

ILLUSTRATED above is a brick of Cornell Iron Cupola Flux—a flux that is most convenient to use—more easily measured—unequalled in results produced.

Simply toss one brick into the cupola for each ton of iron. It will not blow out with the blast but remain in the melting zone until completely consumed.

It produces better and more uniform castings but costs less than fluorspar or straight limestone.

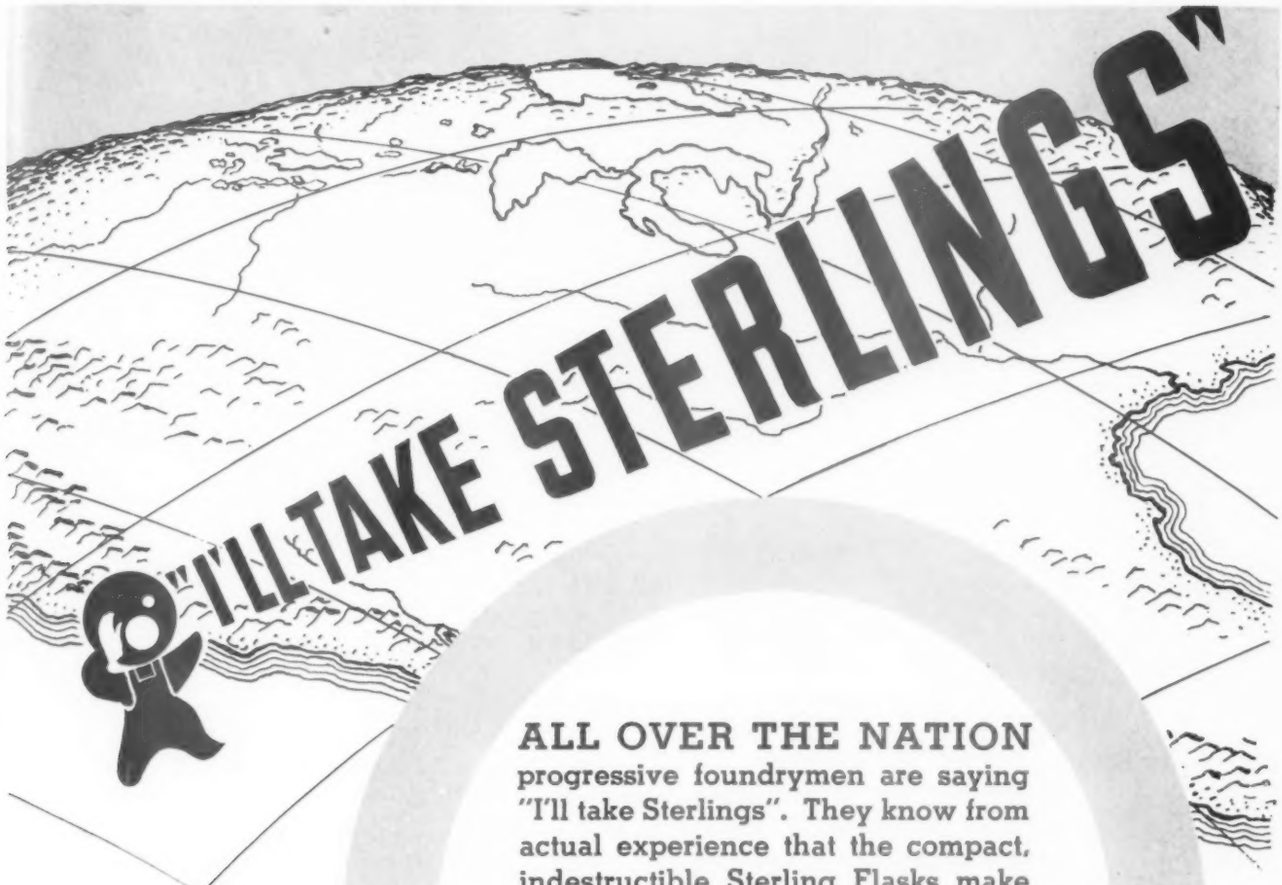
Heats are shortened—iron is hotter, more fluid and softer, if desired—and cupola linings last longer.

A trial will demonstrate results that you may now consider impossible. Write for literature today.

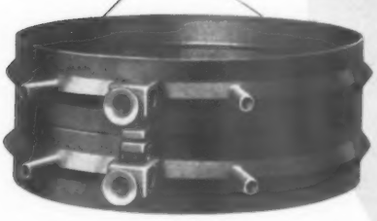
The CLEVELAND FLUX Co.

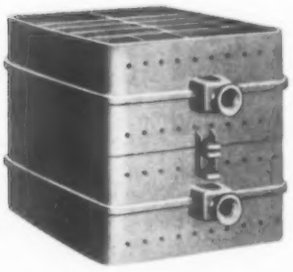
1026-34 Main St., N.W., Cleveland, Ohio

Manufacturers of Iron, Brass and Aluminum Flux Since 1917

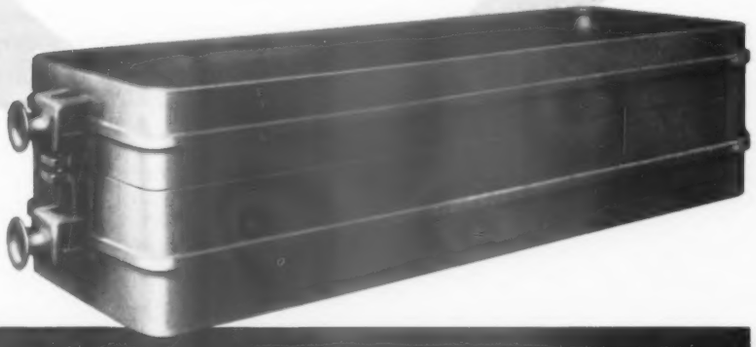


ALL OVER THE NATION progressive foundrymen are saying "I'll take Sterlings". They know from actual experience that the compact, indestructible Sterling Flasks make the work go faster . . save space, time and labor . . . speed production of vital war materials. Sterlings retain rigidity and constant accuracy, even under the toughest 24-hour production schedules. For complete foundry flask service — consult STERLING!





Typical Sterling features include: Rolled steel, one-piece channel with solid center reinforcing rib and square flanges; full-width bearing. (Patent Number 1974292)



Sterling FOUNDRY FLASKS

Flasks available in all styles and shapes . . . all-welded, special rolled steel sections . . . strong but light, for speed and endurance.

STERLING WHEELBARROW COMPANY • MILWAUKEE, WIS., U. S. A.

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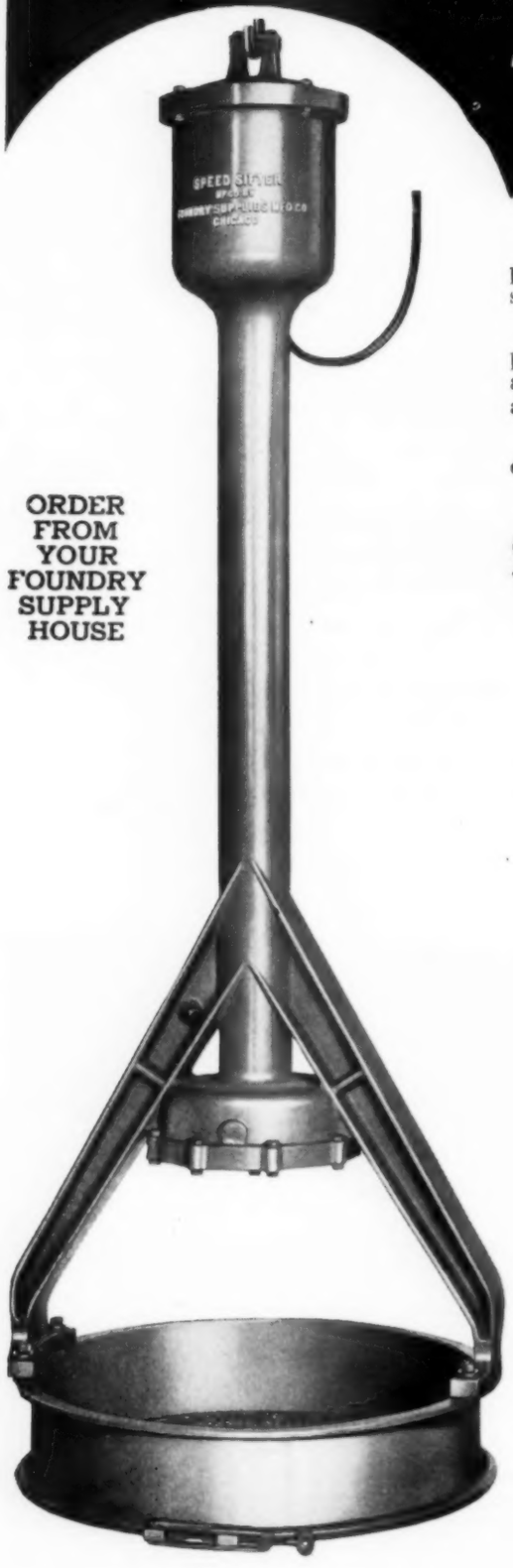
Increase Production with
ROTOPLANE Speed Sifters

"Hard-to-Please" Foundries Standardize on Rotoplane!



ORDER FROM YOUR FOUNDRY SUPPLY HOUSE

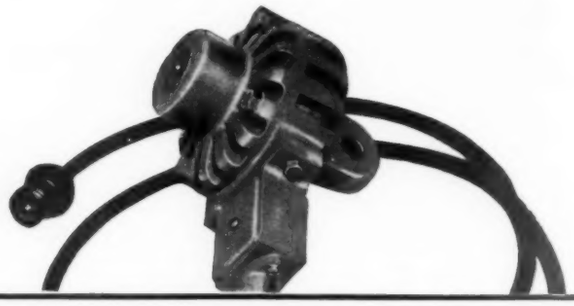
Try ROTOPLANE in your plant. You, too, will find it increases production, does *all* your sifting more quickly and economically. One size and type for all sifting jobs.

ROTOPLANE is built for long, dependable service. Strong, one-piece frame gives remarkably effective vibration. Smooth, free, rotary action. All mechanism completely enclosed and dustproof. Weight approx. 90 lbs., 62 in. high overall.

Steel-mounted sieves instantly interchangeable. No jagged screen edges, no storage problem. 20 in. diameter clear sifting area.

TEN DAYS FREE TRIAL.

$175.00 f.o.b. Chicago—complete with cable, safety ground wire, one sieve (2-4 mesh). Standard ⅓ h.p. motor, 115-230 volts 60 cycle single phase.
Prices with other motors quoted on request.



ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work..... $10.00	No. 5—Heavy match plate, tub, bench $17.00
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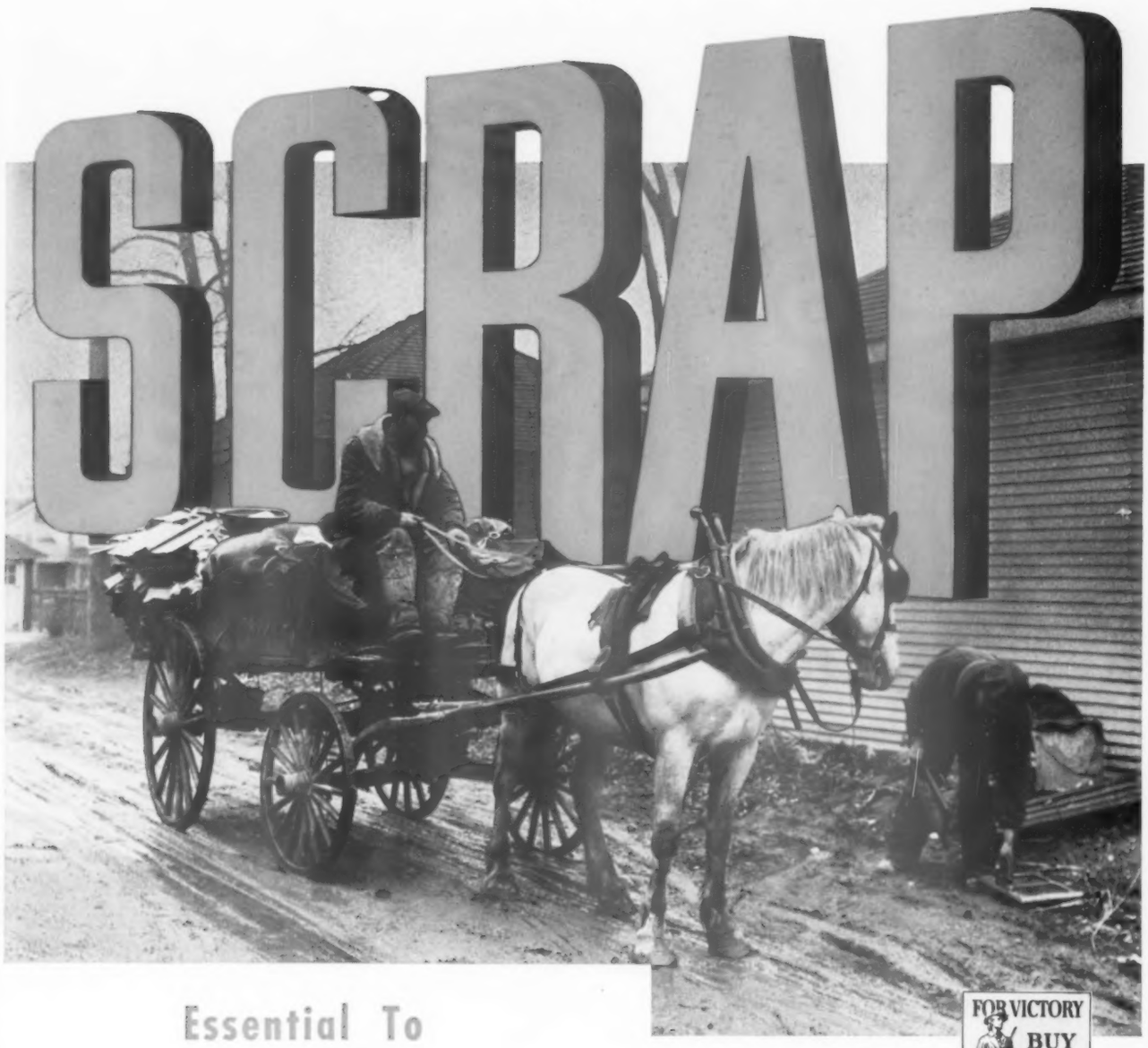
•

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street — Chicago, Illinois

CABLE ADDRESS: "ROTOPLANE CHICAGO"



Essential To America's Industrial Progress

The importance of scrap metal and its place in the economic scheme of things has been forcefully brought home to the nation in the various scrap drives for Victory.

Michigan Smelting specializes in the refining of non-ferrous scrap and by means of unexcelled facilities and equipment—plus 50 years experience—converts it into ingot made to the most rigid and exacting specifications. The refined scrap goes back to industry as usable metal—superior in many respects to alloys of virgin metals.

If your product uses non-ferrous alloys, you may be able to use the high skills and the 50 years of know-how possessed by this organization.

MICHIGAN SMELTING

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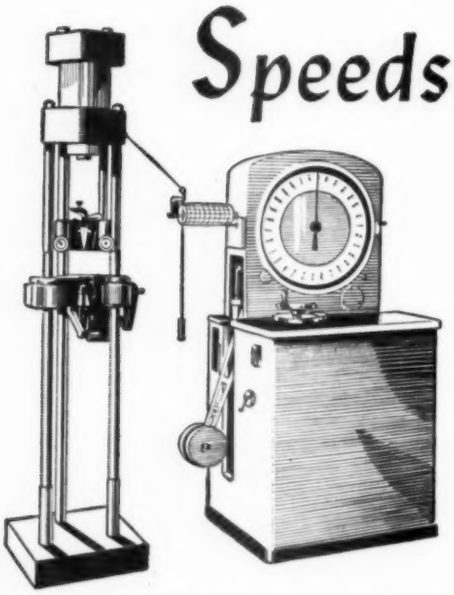
DIVISION OF
BOHN ALUMINUM AND BRASS CORPORATION
DETROIT, MICHIGAN
GENERAL OFFICES—LAFAYETTE BLDG.
Non-Ferrous Scrap Metal Refiners for 50 Years

Speeds production testing



Model P-3 Universal type machine expressly designed for routine testing of wire, sheets and light bars—as well as exacting research work. Open gripping heads at convenient height. Capacities up to 30,000 pounds.

Because of the urgent needs of war, many materials must be tested for service on a production basis. For greater speed in testing, only Riehle Universal Hydraulic Testing Machines offer ONE HANDWHEEL CONTROL. Straining head speeds are completely controlled from fast forward to fast return in one revolution. Provides precise control for slow speeds. Number of testing speeds is unlimited because regulation is stepless. Operation is so simple, Riehle Testing Machines can be operated by anyone with a minimum of training. These machines will help you to produce more and better equipment in the battle of production.

RIEHLE
TESTING MACHINES

DIVISION OF
American Machine and Metals, Inc., East Moline, Illinois

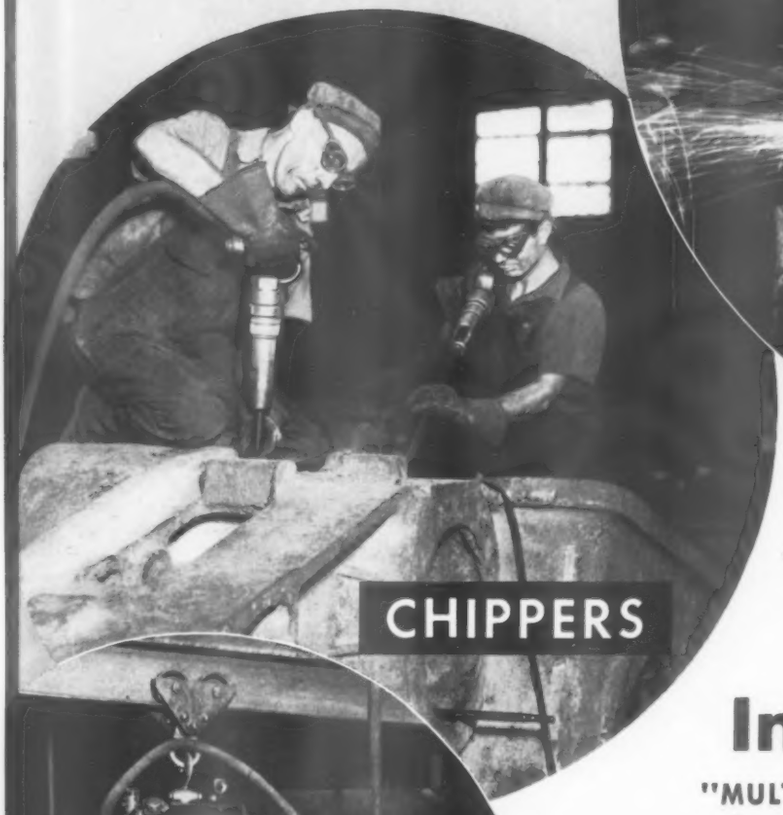
"One test is worth a thousand expert opinions"

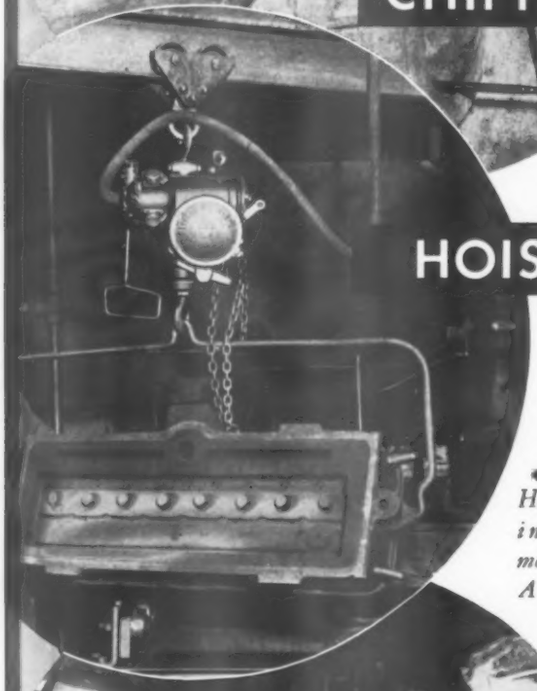
UNIVERSAL MACHINES FOR TENSION, COMPRESSION AND TRANSVERSE TESTING • IMPACT TESTERS • VICKERS HARDNESS MACHINES • BRINNELL HARDNESS TESTERS AND MEASURING INSTRUMENTS

-R AIR TOOLS FOR THE FOUNDRY

Smoothing off hub on steel gear casting with a Size 4F "Multi-Vane" Surface Grinder.

Cleaning a large casting with Size 300 Chippers.





Handling cylinder-head molds with an AIR-BLOC.

A *Saving* In Each Operation

"MULTI-VANE" GRINDERS . . . These powerful, efficient and easily handled tools are equipped with speed governors, automatic lubricators, and two combination radial and thrust ball bearings. Sizes and speeds for grinding wheels from 1½" to 8" diameter.

CHIPPING HAMMERS . . . Well known in foundries and steel mills everywhere, I-R chippers are built with the famous "flapper-valve" which is self-seating and practically indestructible. Operators like their powerful action and easy holding qualities.

"SAFETY-FIRST" AIR HOISTS . . . Ideal for foundry service. Protection from the effects of heat and dust is assured. Because they are free from vibration and have nicely graduated control, they are especially fitted for delicate work such as drawing patterns or lowering a cope onto a drag.

The AIR-BLOC—the latest addition to the hoist line—is a lightweight unit for handling loads up to 700 pounds. It has the same accurate control and safety features of the larger hoists.

SAND RAMMERS . . . Tools that are built especially for foundry service. For years they have been standard equipment in most foundries. The self-seating flapper-valve will easily pass sand and dirt. Operators are assured of a powerful action combined with easy holding qualities.

Size 14 Bench Rammers at work in a large foundry.

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

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Branches or Distributors in other principal cities the world over.

Major
PRODUCTION
Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
TO SPEED
WAR PRODUCTION
Use
FANNER
CHAPLETS AND
CHILLS

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio . Canadian Fanner, Ltd. Hamilton, Ontario

"IRONTON NOJOINT" for Foundry Ladles

Especially for

RECEIVING

•

MIXING

•

DESULPHURIZING

LADLES

"Ironton Nojoint" is manufactured especially for lining receiving, mixing and desulphurizing ladles in foundries where fused soda ash is being used. "Ironton Nojoint" provides a solid monolithic lining which is very resistant to the corrosive action of soda slag and, being free from all joints, prevents premature wearing out of the lining.

"Ironton Nojoint" makes unnecessary the usual problem of carrying special fire brick shapes in stock to fit a particular ladle and patching or re-lining becomes a simple operation.

"Ironton Nojoint" ladle linings may be renewed within a few hours, then after thoroughly drying is again ready for service. The high refractoriness of this material prevents any softening of the lining, it does not shrink or expand and will not spall under severe ladle service conditions.

"Ironton Nojoint" is shipped in steel drums and cartons in a moist, plastic, ready-to-use condition. Ask us for our new literature on this product.

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON **OHIO**

TAM ZIRCONITE PRODUCTS AVAILABLE

TAM
Foundry Zirconite Sand (in three grades)
Melting Points from 3650° F to 3950° F

TAM
Foundry Zirconite Flour (in two grades)
Melting Points from 3650° F to 3812° F

TAM
Foundry Zirconite Mold and Core Washes (in three grades)
Super-refractory compounds with melting points from 3600° F to 3775° F

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Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

Safety Message:
"Collect Magnesium Dust in Oil"

Since magnesium was first cast and fabricated on a sizable scale in the United States, Schneible has been active in the development of equipment for the *safe* collection and recovery of the dust created by magnesium machining and grinding operations. As magnesium dust embodies both fire and explosion hazards, this problem at one time threatened the increased utilization of the lightest of metals.

Specially designed equipment and new methods were required to collect magnesium dust. The downdraft principle was employed in the first magnesium bench made for a leading magnesium producer in 1937. The dust-laden air was drawn down through the bench, which was provided with running water at the bottom; and the air was drawn into a Schneible Dust Collector (which used water as the collecting medium), from whence the air was returned to the building.

This installation gave entire satisfaction, and no fires or explosions resulted. But the fact remained that magnesium dust mixed with water produced hydrogen gas, which is explosive in certain mixtures and the wet magnesium dust from the equipment, when dried out, was also a hazard in handling around the plant.

Schneible eliminated these hazards on this installation by substituting for water a high flash point mineral oil. Spent cutting oil from magnesium machining operations has proved quite satisfactory for this purpose. All subsequent Schneible installations on magnesium dust have used oil as the collecting and cleaning medium, because:

1. Oil-coated magnesium dust particles are safe from explosion or rapid burning. They do not disintegrate and produce hydrogen gas.
2. The air from the equipment may be returned to the workroom, as it contains no hydrogen gas.
3. Either large systems or small units may be used with equal safety, as the best engineering and economy directs.
4. The oil used is spent cutting oil; that is the high flash point oil which has been discarded from the magnesium machining operations. This oil can be used over and over in the collectors.

Schneible equipment for magnesium plants is now complete and includes: downdraft benches in several types for large and small operations; "Uni-Flo" Dust Hoods for use where preferable; pedestal grinder exhaust systems; a number of adaptations of Schneible Multi-Wash Collectors; and Multi-Louver Settling Tanks for recovering the magnesium dust and returning the oil to the collector system. All Schneible Systems are characterized by low cost, maximum safety, moderate operating cost and minimum maintenance.

●

Write for Bulletin 1142 on magnesium dust collecting to CLAUDE B. SCHNEIBLE CO., 3953 Lawrence Avenue, Chicago, Ill. Engineering Offices in Principal Cities.

SCHNEIBLE

DUST AND FUME CONTROL EQUIPMENT

FASTER DRYING

with

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ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

portable

MOLD DRYER

FAST HEAT-UP
QUICK DRYING

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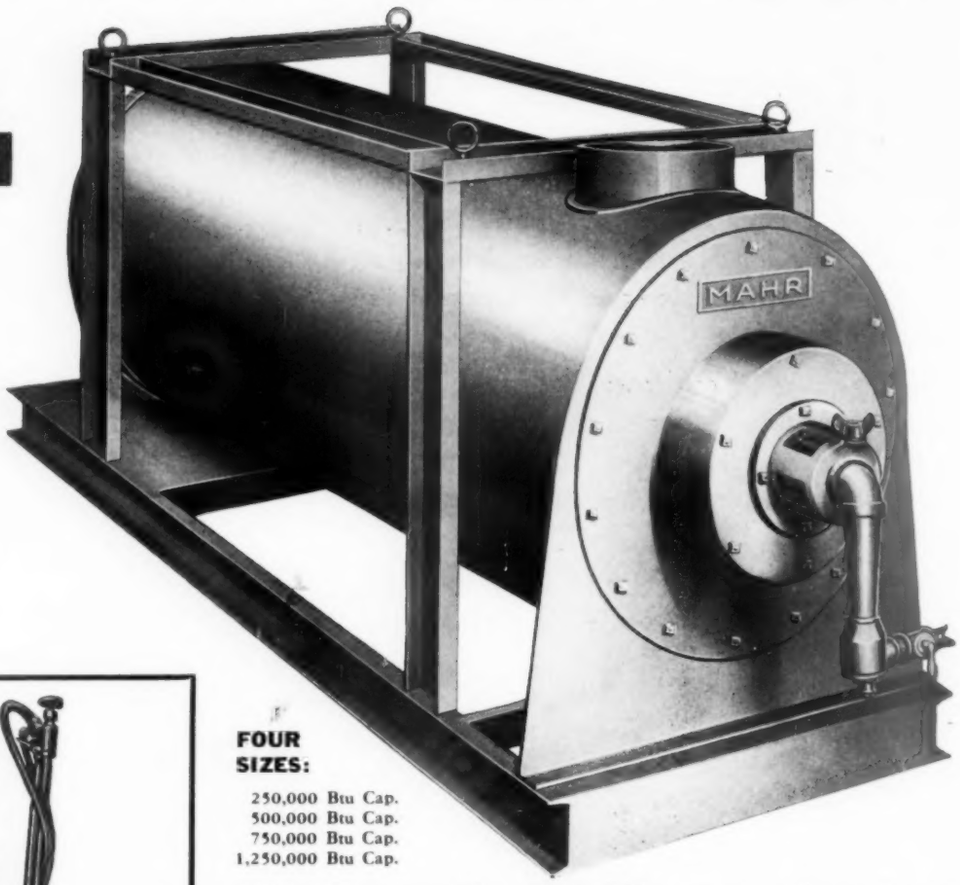
HEAVY STEEL
CONSTRUCTION



FOUR SIZES:

250,000 Btu Cap.
500,000 Btu Cap.
750,000 Btu Cap.
1,250,000 Btu Cap.

Hi-Speed, Uniform Drying

Large, cumbersome molds are difficult to handle in drying, yet proper and quick drying is one of the most important elements in producing a good casting. After long and exhaustive study and tests of many drying methods in our own and other foundries, we are proud to announce this newest member of an old family.

Designed by an organization long experienced in industrial heat application, and thoroughly tested under everyday foundry conditions with outstanding performance results. Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are shortened.

With contracts for many very large castings today, several foundries are already using batteries of these dryers with a great saving in time and costs.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion.

FOR OVER A QUARTER CENTURY, the name MAHR has been associated with industrial heat equipment of quality and the most modern design. These products include CORE AND MOLD OVENS, FURNACES OF ALL SIZES AND TYPES FOR ANNEALING, STRESS RELIEF, ETC., FORGES, TORCHES, BURNERS, BLOWERS AND VALVES.

Write, Wire, or Phone for Bulletin and Prices

Get our fully illustrated and descriptive bulletin telling all about this dryer. It can be used nearly every day in any foundry. Write, wire or phone TODAY for complete information.

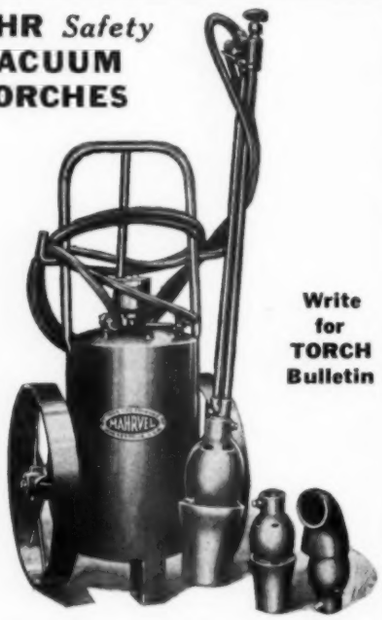
Sales Offices in Principal Cities

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

1709 NORTH SECOND STREET • MINNEAPOLIS, MINNESOTA, U. S. A.

MAHR *Safety* VACUUM TORCHES



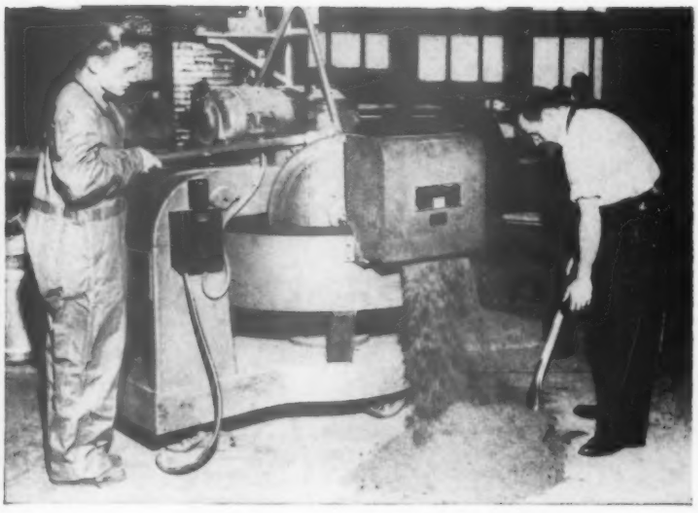
Write for TORCH Bulletin

Used extensively in foundries, railway shops, etc. wherever intense heat is needed. Throws long, hot flame. Burns kerosene. Lights instantly without pre-heating. It's safe!

MAHR JIFFY TORCH

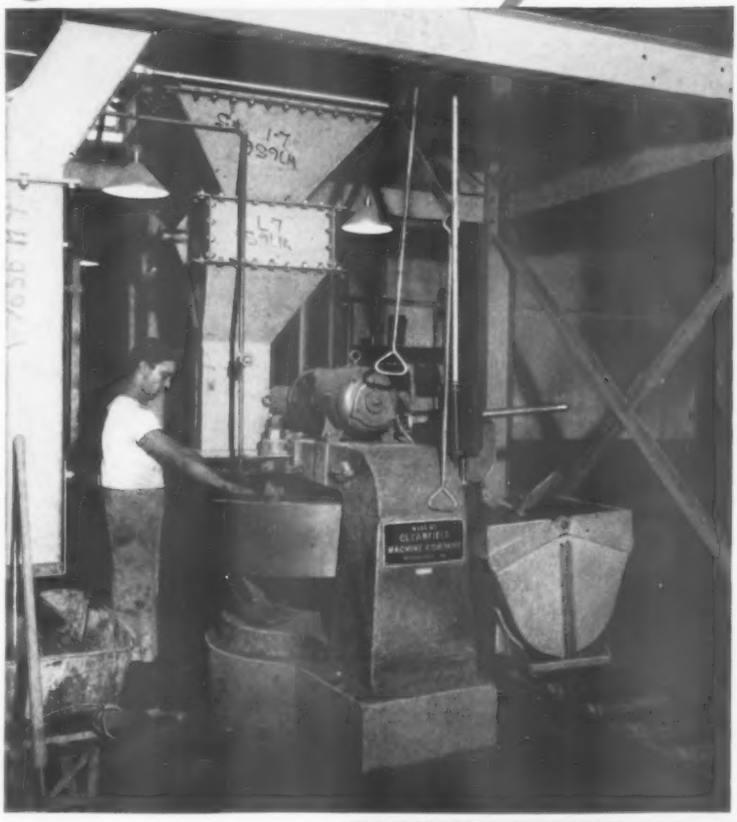
Produces steady, intense flame to 5 feet. Lights instantly — no pre-heating. Operates from compressed air line at 30 lbs. or more. 2 sizes.

The 404 operated on Crane Hook.



The 404 with Casters. Note the finely diffused stream of sand.

Versatility...THE CLEARFIELD "404" MIXER



The 404 engineered into a Production System

Small, compact and of low power consumption, the 404 fits into many types of sand handling requirements, as indicated by the illustrations.

The 404 is our smallest unit. Clearfield Mixers are built in an adequate range of capacities for all foundry requirements.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

Clean Shut-Offs because they hold their shape LONGER!

ELECTRO STOPPER HEADS

No need going into details on the hazards and wastes of stopper head cracking and washing. It's sufficient to say that leaking heads (because they lack adequate spalling resistance) cause defective ingots.

Only correct, closely controlled blending of materials (clay and graphite) assures uniform structure. Here then, in a nutshell, is the primary reason for Electro's selection by modern open hearths, steel foundries and electric furnaces.

The supply of Electro Heads is not threatened by any shortage of materials.

NEW BULLETIN Gives Complete Information. Write Today!

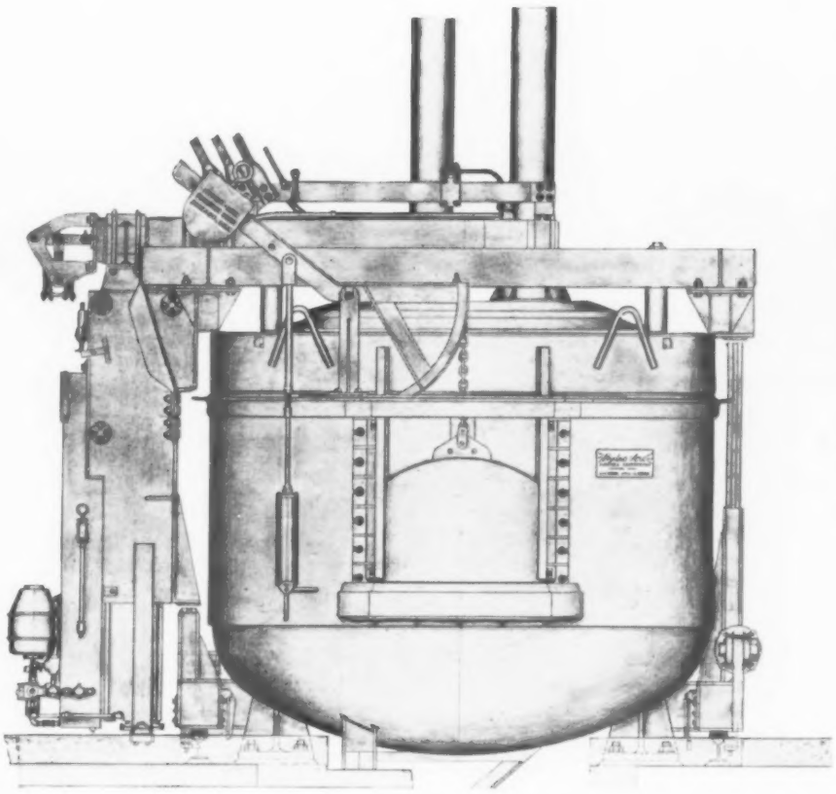
ELECTRO REFRACTORIES AND ALLOYS CORP.

GENERAL OFFICES: ANDREWS BUILDING, BUFFALO, N. Y.

Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels

The **HYDRO-ARC** *Electric Furnace has*

Power Operated Electrode Clamps



The Electrodes are slipped from the floor. Men are not required to get on top of the furnace

This is only one of several advanced features of the Hydro-Arc Electric Melting Furnace. It has a record of especially low operating costs . . . it has low carbon pick up . . . . low electrode and power usage.

Low inertia counterbalancing and small reversing pump motors (which do not surge above their full current rating) result in (1) highest electrode speeds on automatic control, (2) most accurate positioning. The electrodes start and stop instantly in cooperation with the new automatic controls. There is less surging . . . . improved power factor and less transformer heating.

Write for more information about what has been called "The most important development in electric furnaces in the past twenty years".

HYDRO-ARC **FURNACE CORPORATION**
561 HILLGROVE AVENUE, LA GRANGE, ILL.
(A suburb of Chicago, Ill., U. S. A.)
Telephones: La Grange 4545 and 4546
Chicago Line: Enterprise 1068

Associated with Whiting Corporation

When the lights go on a

Cast in letters of flaming metal to reflect against the sky, heralding the dawn of a new era—an era of determination, work and accomplishment—an era of the re-establishment of individual rights and the pursuit of happiness.

THE great part the foundry industry is and has been playing in the war production program of the United Nations is difficult for anyone to realize who is not directly connected with cast metals in some form.

That the foundry industry is already planning to quickly turn their war development and research to peace-time uses, becomes more and more apparent.

The 47th Annual A. F. A. Convention and War Production Congress to be held in St. Louis April 28, 29, 30, will devote several sessions to the discussion of war and peace-time castings, their important part in stepping up the efficiency of tanks, guns, planes and ammunition and how and why this experience will be of benefit to the building of a better world—when the lights go on again!

No one connected in any way with the foundry industry will want to miss the 1943 A. F. A. Meeting in St. Louis. Plan now to attend—see that all your key men are present. They will go away refreshed and enthused over their contacts with other foundrymen, equipment manufacturers and suppliers who are pushing production to the limit and giving of their knowledge and strength that the world may be a better place in which to live.

THREE IMPORTANT DATES

again . . . ALL OVER THE WORLD

47th Annual

A. F. A. CONVENTION AND WAR PRODUCTION CONGRESS

THE FOUNDRY

FOR APRIL

THE PRE-CONVENTION ISSUE

This issue of THE FOUNDRY will constitute a complete preview of these important days and will contain information of interest and importance to the entire foundry industry—a complete resume of the program of meetings and an outline of the war production congress which will again this year be held in conjunction with the convention. All this in addition to the regular features to be found in any issue of THE FOUNDRY.

FOR JUNE

THE POST-CONVENTION ISSUE

Of unusual importance this year will be the Post-Convention issue of THE FOUNDRY, reporting the many technical meetings with particular attention to the discussion of the war production effort of the foundry industry. The part cast metals are playing in the war effort of our nation is a very important one and the contents of the June Post-Convention of THE FOUNDRY will be valuable reading for all foundrymen whether they can attend the convention or not.

NOTE: To all manufacturers and suppliers who in any way contact, sell and serve the foundry industry, these two issues of THE FOUNDRY present an invaluable advertising opportunity geared to important changes in foundry practice and at a time when the eyes of the entire industry are turned on the St. Louis convention.

S . . APRIL 28-29-30 . 1943

WASHED DRIED AND SCREENED SILICA SAND

Carefully Selected and Graded for Foundry Use—

FOUNDRY men throughout the country know the exceptional qualities of the uniformly screened grades of silica sand produced by the Ottawa Silica Company.

The grains being almost spherical, afford greater permeability and consequently finer sand can be used, effecting better finish.

Ottawa sands are durable! They do not break up! They are ideal for sand slinger work and are without equal for all foundry purposes where synthetic sands are employed.

FLINT
MOLDING AND CORE SAND
SILICA

A HARD, fast-cutting, thoroughly washed, dried Sandblast Sand, screened to uniform size, is produced by the Ottawa Silica Company and sold under the trade names FLINT SHOT and DIAMOND SANDBLAST SAND. It is the most economical agent that can be employed for all kinds of exacting sandblast cleaning. The round, pearl-like grains are hard as flint. They do not split up, but wear down uniformly and can be used over again many times. This abrasive flows freely, requiring less air power and gives the castings a smooth, silvery-like, velvety finish. Ask for our booklet, "Sandblasting Up To Date".

FLINT
IT PAYS TO USE
SHOT

DIAMOND
SAND BLAST

THE Ottawa Silica Company's three mills operate continuously the year round, making it possible to supply foundries with material promptly. Production includes a complete line of foundry sands suitable for molds, cores, furnace bottoms, sandblasting, for use generally in the steel, grey iron and non-ferrous fields—also Ground Silica (Silica Flour). The Ottawa Silica Company's engineering staff is always available for consultation and service on problems relative to the use of Ottawa Sands.

CRYSTAL
99 44/100 PURE
SILICA

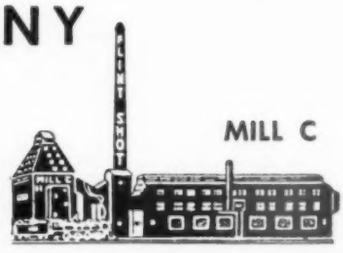
OTTAWA SILICA COMPANY

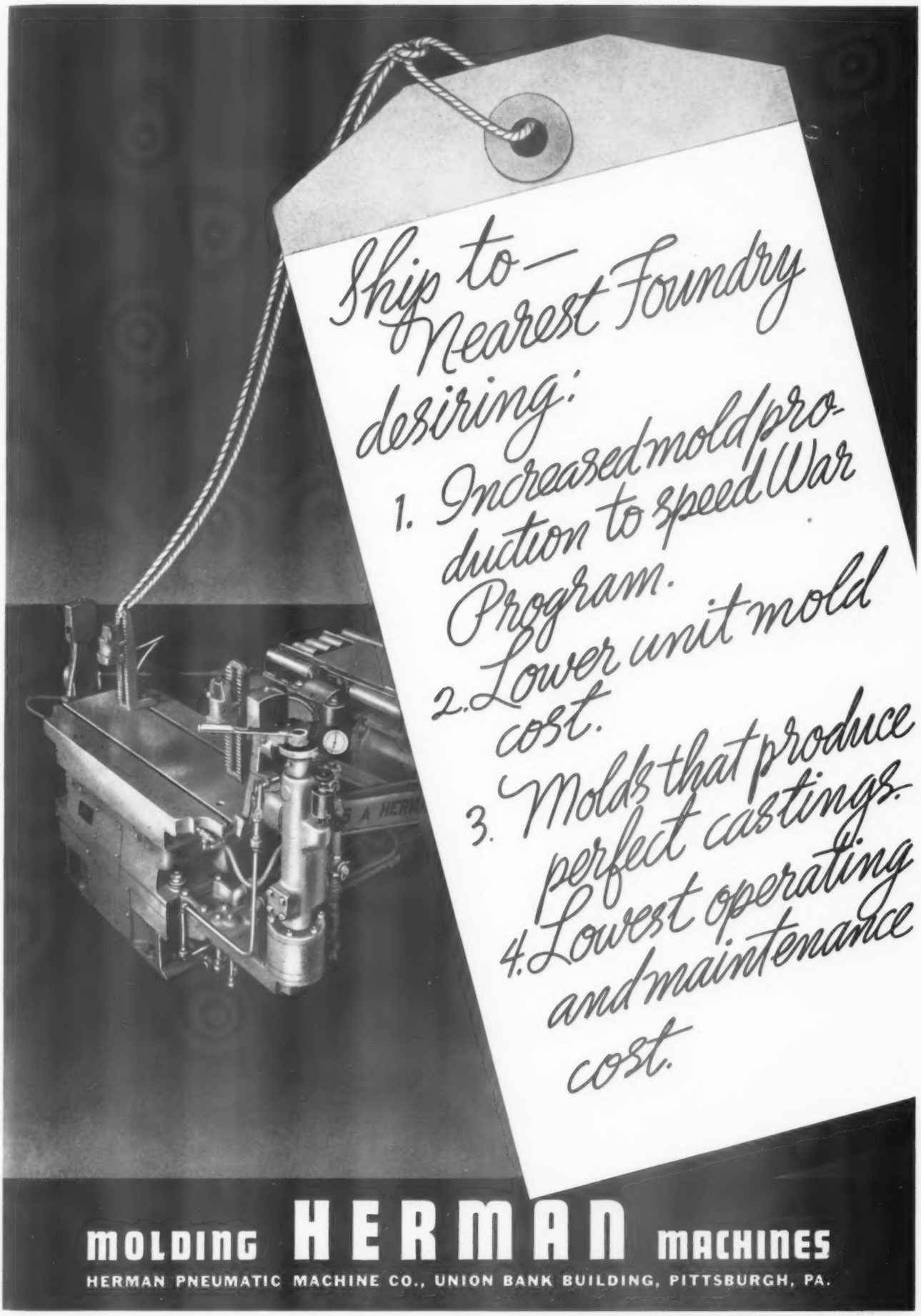
Ottawa, Illinois

MILL A

MILL B

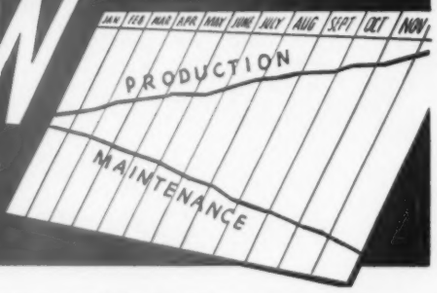
MILL C




Ship to—
Nearest Foundry
desiring:
1. Increased mold production to speed War Program.
2. Lower unit mold cost.
3. Molds that produce perfect castings.
4. Lowest operating and maintenance cost.
MOLDING HERMAN MACHINES
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

BESSEMER FERRO-SILICONS
GLOBE IRON
COMPANY
JACKSON
OHIO
JACKSON COUNTY
SILVERIES
SPECIAL HIGH SILICON GRADES
FOUNDED 1872

HOW STAYNEW FILTERS
FOR AIR • GASES • LIQUIDS
INCREASE PRODUCTION
DECREASE MAINTENANCE



STAYNEW PIPE LINE FILTERS KEEP AIR-POWERED TOOLS WORKING SMOOTHLY

MODEL CPHS
For Compressed Air Lines

On compressed air lines, Staynew Filters prevent the passage of dust, dirt, rust, pipe scale, and condensed moisture. Solid matter causes clogging and loss of power in air-powered tools; water washes away lubrication or freezes such tools; both solid matter and water may cause delays and waste at other points.

Remove Sediment from Liquids

On liquid lines, Staynew Filters assure clean water, coolants; fuel, lubricating and other industrial oils; many special liquids.

Eliminate Hazard of Oil and Moisture in Automatic Controls

Many special pipe line filters available, including new "super" filter for the removal of traces of oil and moisture from lines to air-operated control instruments.

★ ★ ★ ★

STAYNEW INTAKE FILTERS MAINTAIN EFFICIENCY OF ENGINES AND COMPRESSORS

Staynew Intake Filters prevent the suction of dust into engine and compressor cylinders. Dust scores cylinder walls, clogs valves, causes excessive carbon formation, wears reciprocating parts. Users report important reduction in upkeep, continuous efficiency. Complete range of sizes; models include SILENCER - FILTERS.

MODEL D
For Engine Intake

STAYNEW VENTILATION FILTERS *UP* WORKER PRODUCTION, *REDUCE* BUILDING CARE

Staynew Ventilation Filters guarantee delivery of clean, dust-free air, reducing cost of building maintenance, adding to efficiency of employees, eliminating health and accident hazards and preventing waste in many operations and processes. Automatic and Panel types, including fire-resistant constructions and media.

Automatic Air Filter for Building Ventilation

RADIAL FIN INSERT

Exclusive
RADIAL FIN CONSTRUCTION
Permits high ratio of filtering area to space occupied. Back pressure is thus relatively low with minimum servicing. It is long-wearing and presents no broad, flat surfaces to break down under destructive pulsations. Featured in pipe line and intake models.

HAVE YOU A FILTER PROBLEM?

Special *Aircraft* Filters Designed by Staynew Engineers

The broad experience of Staynew engineers is proving invaluable to aircraft manufacturers and designers. This experience, product of more than two decades devoted exclusively to filter manufacture, is yours for the asking.

COMPLETE CATALOG

40 pages describing and illustrating entire Staynew line. Write for copy, mentioning special problems.

STAYNEW FILTER CORP.

FILTER HEADQUARTERS — 36 CENTRE PK., ROCHESTER, N. Y.

PROTECTOMOTOR
99 10 Per Cent
AIR FILTERS

There Is No Substitute For *Results*

It is a principle of logic that every "effect" must have a "cause" which is only another way of saying "you can't get blood out of a turnip".

In judging a product (the cause), you've got to look to the results it produces (the effect) to determine its true value in relation to others in the same field.

If the results are superior—a *better* job in *less* time and at *less* cost—then it is only logical that the product, too, must be superior in construction and engineering design.

That reasoning is especially true with airless Wheelabrator blast equipment, because the results it produces are unequaled in the field of blast cleaning. A test on your own work will show very vividly why that is true.

WHEELABRATOR
The Original AIRLESS
BLAST EQUIPMENT
More than 2000 in Use

PROBLEM Reorganize cleaning department to meet sharply increased production

SOLUTION 6′ Plain Wheelabrator Tablast

RESULT Speedier handling with a $6514.00 yearly saving

When the Fulton Foundry & Machine Co., Cleveland, Ohio, installed their 6′ Plain Wheelabrator Tablast they were able to eliminate three tumbling mills, expedite casting shipments and materially reduce storage space and handling expense.

As a result of this cleaning department reorganization, daily savings of over $23.60 are being effected in cleaning costs alone and the entire organization has been keyed up to a maximum improvement.

PROBLEM Cleaning 6 to 8 tons of varied size castings hourly

SOLUTION Wheelabrator Special Cabinet utilizing three Wheelabrator units

RESULT 95% of foundry's entire production cleaned in one machine

Thorough cleaning of castings weighing from one pound to one ton—approximately 95% of the production of green castings—is obtained with the Wheelabrator Special Cabinet at Spring City Foundry Co., Waukesha, Wisconsin. Nearly half the total tonnage passes through the Cabinet a second time to remove scale after heat treating.

Castings are carried into the cabinet on the monorail conveyor at the rate of 40 hooks per hour. Only one pass through the Cabinet is required to remove every trace of foundry sand or scale from all corners or pockets of intricate shaped castings.

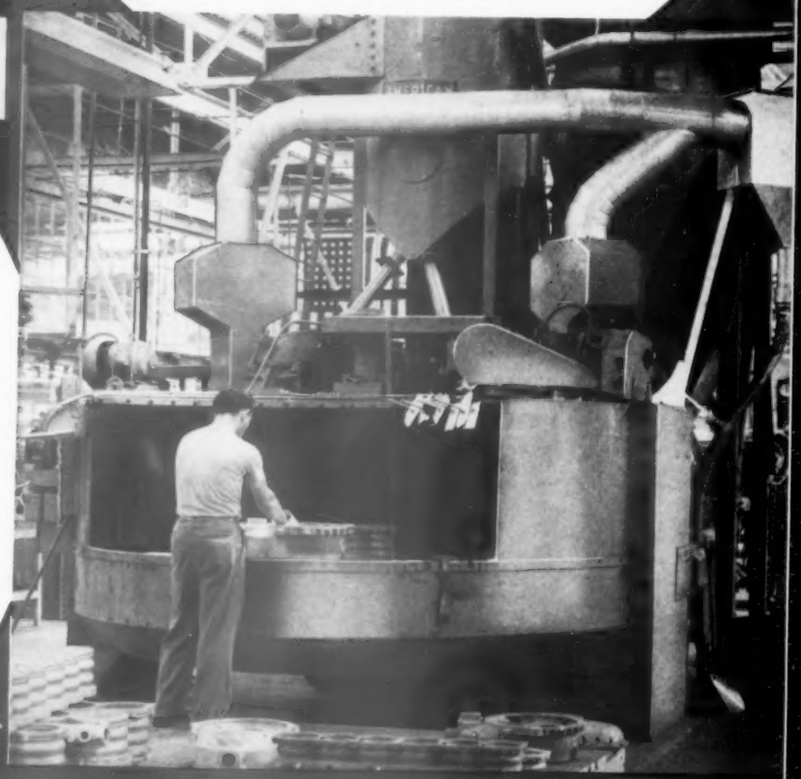
PROBLEM Speed up cleaning operations

SOLUTION Installation of a 48″ x 42″ Wheelabrator Tumblast

RESULT Cleaning time decreased 66⅔%

Whereas 30 minutes had been required to clean 500 pound loads of hard iron and annealed permanent mold castings with inefficient blast barrels at the Elmira Foundry Co., Elmira, N. Y., only five minutes are now needed to handle a larger quantity of the same work in the 48″ x 42″ Wheelabrator Tumblast.

2300 pound loads of exceptionally difficult to clean heat treated bearings are Wheelabrated in less than one-fourth of previous time necessary. Savings of several dollars per ton have also been realized due to the faster cleaning resulting.



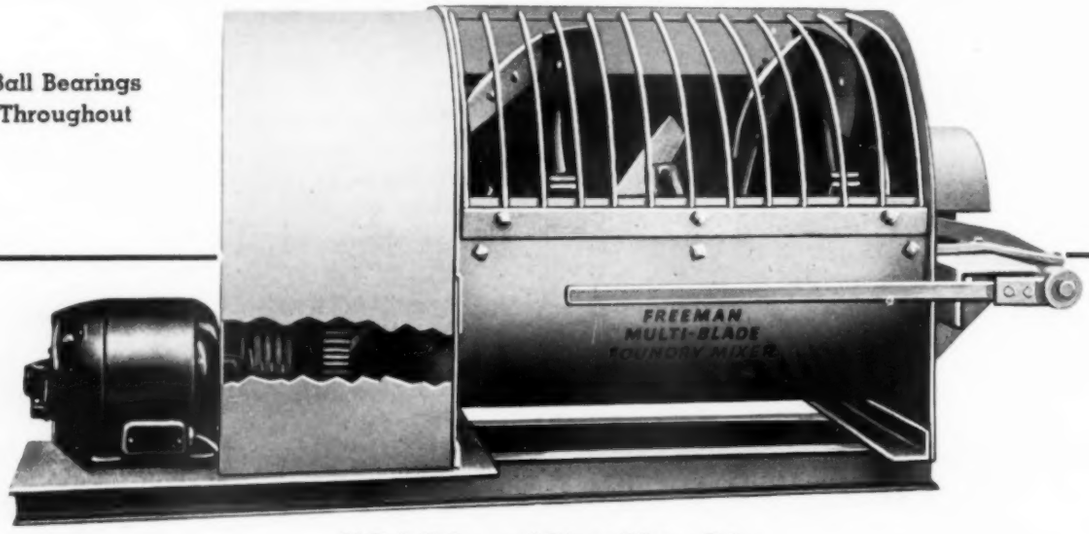
AMERICAN

FOUNDRY EQUIPMENT COMPANY

[illegible] S. BYRKIT ST. • • MISHAWAKA, INDIANA

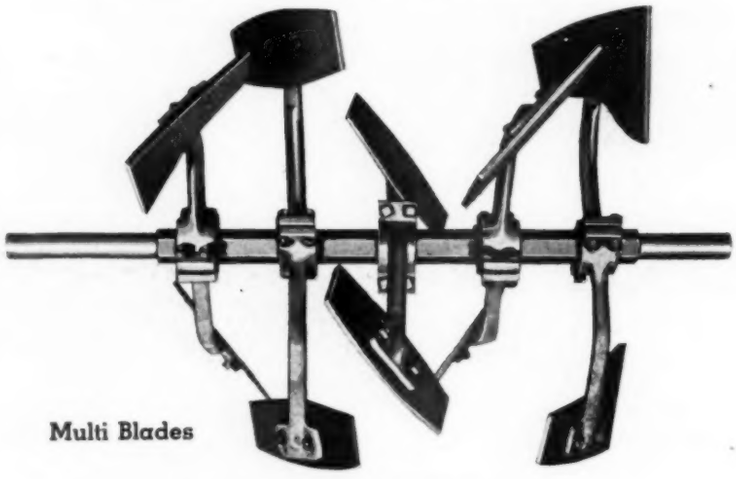
MULTIBLADE
FOUNDRY MIXER

Ball Bearings
Throughout



V Belt Drive and Direct Motor Drive
Available in Sizes from 3 Cu. Ft. to 60 Cu. Ft.

MORE BLADES • LESS OIL



Multi Blades

MORE MIX • LESS FIX

STANDARD EQUIPMENT

Multi Blades
Ball bearing Throughout
Renewable Liners
Machined Gears and Fly Wheel
(Belt Driven Model)
Geared Head (Direct Motor Driven Model)
Steel Guards Covering All Moving Parts
Grid Cover

OPTIONAL EQUIPMENT:
Skip Loader—Skip Hoist Loaders

Write for Multiblade Bulletin or Sketches for Special Installations

THE FREEMAN SUPPLY COMPANY
TOLEDO, OHIO

PATTERN SHOP AND FOUNDRY SUPPLIES AND EQUIPMENT

WPB Asks Foundries To Utilize Alloys To the Fullest Extent

SHORTAGES of alloys employed in the production of iron and steel castings necessitate every effort toward conservation. The importance of the problem and the work being done by WPB in furthering conservation are illustrated in the following taken from a recent letter to the Gray Iron Founders Society from Donald J. Reese, chief, Iron and Steel Manufacture Section, Metallurgical and Conservation Branch, War Production Board, Washington:

All of the iron and steel making alloys are in a strategic position and at the present time the production rate on several of the alloys is considerably less than the demand.

We find that numbers of gray iron foundries produce a soft grade base iron and attempt to achieve superior mechanical properties by using considerable quantities of ladle-added alloys. If the base iron was designed for alloying, these same foundries would require about one-half as much alloy. When they use alloys only for ladle additions, their actual demand is for primary alloys, versus other industries which utilize both primary alloy and secondary alloy obtained from scrap.

We also find that most gray iron foundries alloy only a portion of their daily tonnage and have not segregated the alloy sprues, gates, risers, and scrap castings to salvage the alloy content of this material.

As far as gray iron foundries are concerned, it means they require three, four, and five pounds of alloy to do the metallurgical job that one pound of alloy could do. Another way of saying the same thing is that the alloys are only 20, 30 and 40 per cent efficient. Last June WPB announced a scrap segregation order, known as M-24-c, requiring every generator of scrap producing 10 tons or more per month to segregate scrap according to its alloy content. This order pertains to the foundry industry in reference to sprues, gates, risers, etc., as well as to machine shops processing the castings. If every gray iron foundry would get a pound of good from each pound of alloy used, I am quite sure that they could continue to maintain the quality in the product that gray iron foundries now strive for. However, foundries will not be able to get the quantity of alloy that they have been getting in the past, due to the fact that we do not have sufficient alloys to satisfy demands.

We are asking the gray iron foundries to examine and check, and to be sure that they do not use any more alloys than necessary; that they make every effort to study their foundry problems, to segregate shop returns and to utilize the alloy value of this revert.

We recognize the fact that a foundry may have a conveyor system which only takes a small portion of its hourly melt and that it is extremely difficult in these cases to re-arrange methods of melting and pouring to get alloy salvage from revert. There are also innumerable other features of operating a foundry that have a bearing on what the foundry can do in salvaging these scrap materials containing alloys. We are really asking the gray iron foundry industry to do a job beyond what has been done in the past and we believe that with their co-operation we can gain considerable in the conservation of alloys which will permit the industry to maintain quality in its products. In brief, we are asking every gray iron foundry to strive for 100 per cent efficiency in using alloys, and although perfection may not be possible in very many cases, most of the industry can do a great deal better than has been done.

Absenteeism Grows

ABSENTEEISM of the inexcusable type is hampering seriously the production of much needed war materials. The situation continues to grow more serious, and cannot be discounted by pointing to the marvelous production records of American industry since we entered the war. Regardless of what has been done, the fact remains that preventable and inexcusable "job absences" must be curtailed sharply if our troops are to have war materials in the quantities necessary to prosecute successfully the new offensive.

We believe that most managements have done everything in their power to bring home to workers the importance of the individual contributions to the war effort, that supervision has been excellent considering shortages of trained supervisors, and that the scheduling of work and the procurement of material has been good in spite of handicaps resulting from shortages of materials, expanding production schedules, and too much red tape and paper work required by the government war agencies. Management has studied the problem of absenteeism, has tried to improve the situation through appeals to reason, patriotism, and love of relatives or friends; it has utilized pressure, publicity and group competition. While improvements usually result from these efforts, the reformation generally is of short duration.

In the vast majority of cases, inexcusable absenteeism is the result of war prosperity. Workers guilty of this offense against the war effort are receiving more money in wages than ever before, but lack the mental balance to handle this windfall. This situation is only being aggravated by government control, such as the recent 48-hour week order which in too many instances acts as a pay increase. At the same time it is doubtful if the new efficiency corps, recently announced by WMC can solve this problem. If management, acquainted with local situations and individual temperaments, cannot find the answer to absenteeism, it seems doubtful that the government can create a civilian agency with sufficient knowledge and experience to show management how to utilize manpower effectively. But the fact that Washington now recognizes the seriousness of the situation may indicate a more intelligent approach to the problem.

Frank G. Steinebach
Editor

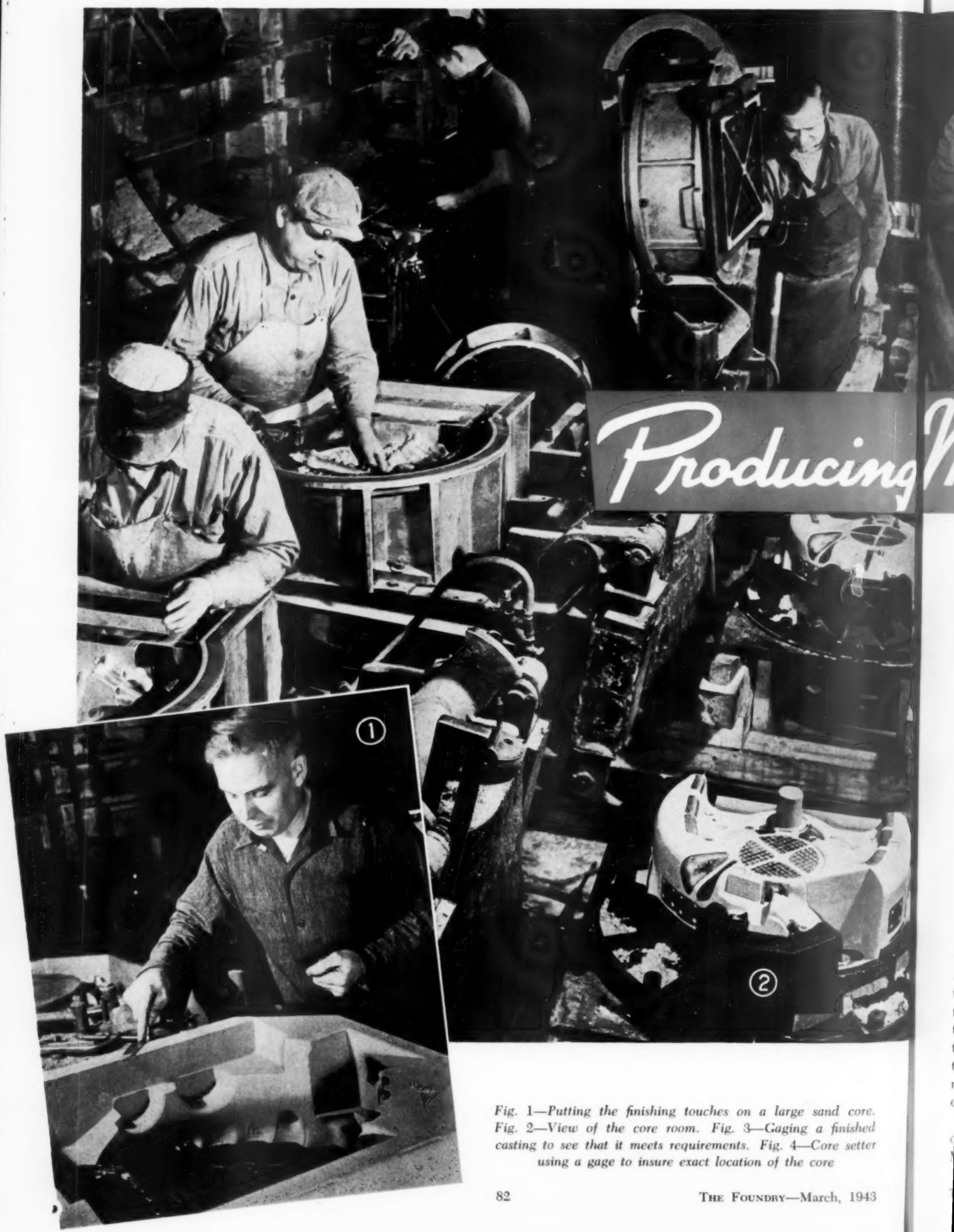


Fig. 1—Putting the finishing touches on a large sand core. Fig. 2—View of the core room. Fig. 3—Gaging a finished casting to see that it meets requirements. Fig. 4—Core setter using a gage to insure exact location of the core

Magnesium Castings

By EDWIN BREMER

SUCCESSFUL production of magnesium castings depends largely upon adequate supervision and constant technical control. How those principles are applied in melting and pouring technique was discussed in a previous article which appeared in the February 1943 issue of THE FOUNDRY. The same considerations hold in molding and coremaking, and after a definite practice is established, no changes should be made until careful investigation indicates that they are warranted. Due to the low specific gravity of magnesium the molding sand and the core sand used must possess relatively high permeabilities so that any gases generated when the molten metal strikes those materials will vent through the sands rather than blow back into the metal.

In addition, some type of inhibitor must be present in both green and dry sand to eliminate the reaction between moisture and molten magnesium on one hand, and to insure a nonoxidizing atmosphere within the mold cavity on the other. While some light magnesium castings are produced in natural molding sands certain characteristics of those sands, such as relatively low permeability and high moisture content in the working stage, limit their application. Hence, the trend in the production of magnesium castings is to synthetic sands which lend themselves readily to the formulation of tailor-made sands to meet specific requirements on grain size, binder content, and moisture. Use of synthetic molding sand also makes it possible to use the same base sand for making cores.

While some foundries use different sands for production of light, medium and heavy section castings, the American Magnesium Corp., Buffalo, has found it extremely advantageous to use only one synthetic molding sand for all types of castings, since it eliminates possibility of using the wrong type of sand for a given casting. One sand in the foundry also greatly simplifies sand storage and sand handling problems. The base material is a sharp, washed and dried, silica sand with an A. F. A. grain fineness of 65, and the same sand is used for producing cores. Binder employed is bentonite, although in some cases a small amount of fireclay also is added. Bond content is about 3 per cent. The sand and binder are mixed in a muller type machine with 3 to 3½ per cent water to obtain the desired temper. During mixing the inhibitors are added. The final product has a permeability ranging from 100 to 150. Since part of the inhibitor content is disintegrated during pouring, it must be replaced when the sand is retempered. To maintain the sand characteristics at the desired point, tests are conducted at regular intervals in the sand control laboratory.

Special consideration is given to the production of cores so that they will meet the varying service requirements imposed upon them. They must not be made from too fine a sand since that leads to trouble from blowing, rat tails, gouging, etc. Due to use of inhibitors in the core sand, the binders employed must be such that they can be baked at low temperatures. The cores must have comparatively high green strength so that they will stand up without deformation until they are baked. In general cores must be in foundry parlance, "soft", so that they can be knocked out easily and at the same time prevent cracking of the casting during solidification and contraction. However, some portions of the core may have to be hard to prevent scouring and rubbing off, or to permit better

handling, as in the case of core prints. Thus, it can be seen why control is so essential in production of magnesium castings.

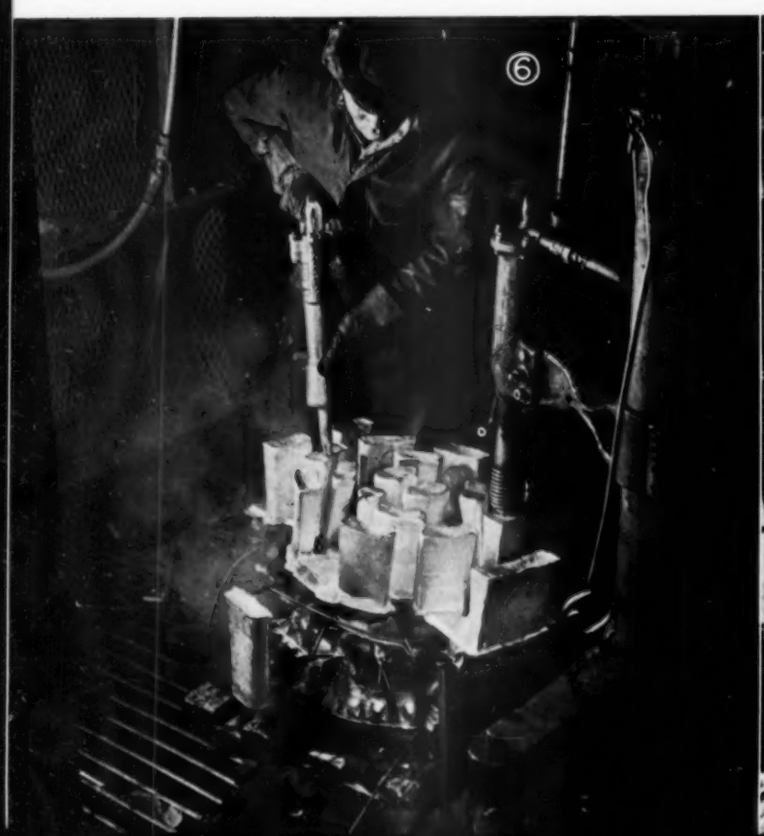
At the American Magnesium Corp. four standard mixtures are in general use. The sand, as previously mentioned, is the same as used for molding—a sharp, washed and dried, silica sand with an A. F. A. fineness of about 65. One mixture is used for side cores and others where there is no danger of a cracked casting or difficulty with knockout due to hardness. Corn flour is used for green strength, but the principal binder is a proprietary, low-baking emulsion, and the baking temperature is from 350 to 370 degrees Fahr. Another mixture is used for body cores where cracking or knockout might be a problem. Corn flour is used for green strength and the principal binder is a readily decomposed synthetic resin. That mixture is baked at 350 degrees Fahr.

A third and quite important core composition termed a "jacket mix" is used for all cores which are completely or almost completely surrounded by metal when the casting is poured. They are characterized by good strength, high permeability, low gassing tendency, and easy knockout. The cores are made from the 65 grain sand unless higher than usual permeability is desired. In that case some coarser sand is included in the mix. No green bonding material is included in the jacket mix. Dry bond is provided either by a synthetic resin of low gas content or by a mixture of the low-gas synthetic and an easily decomposed synthetic resin. The cores usually are baked at 350 to 370 degrees Fahr., but the baking temperature may be as high as 500 degrees Fahr. for cores in which the gas must be low.

A fourth core mixture is termed a "hard sand mix", and is used for prints, ram-up cores and for those sections of softer cores which must resist handling and abrasion. It is similar in composition to the side core mix using corn flour as the green bond, but twice the amount of proprietary low-baking emulsion. Baking is at the same temperature—350 to 370 degrees Fahr.—as for side cores. All core mixtures except that for jacket cores contain a protective agent to prevent oxidation of the magnesium. Both materials are added to the sand during compounding. Cores are baked in batch type ovens with recirculating principle, and the time varies from 2 to 3 hours depending upon the size. Dry permeability of the cores ranges from 150 to 200.

Production of cores for magnesium is quite similar to that used for other metals and alloys, and cores are made by hand and on machines. However, in assembly special pastes, muds and washes are employed. Those materials

Fig. 5—Checking a casting in the layout department. Fig. 6—Knocking out cores from a casting with a pneumatic hammer. Fig. 7—Test bars made at the same time as castings being checked for physical properties

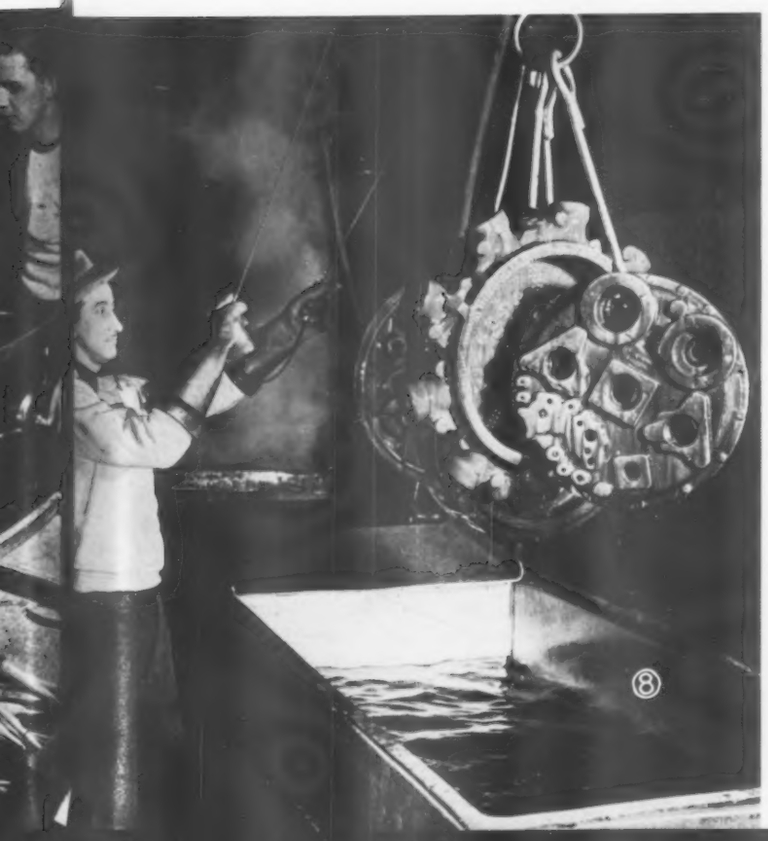


are low in moisture and volatile matter, or contain inhibitors to prevent reactions within the mold. Naturally, after the use of the muds, pastes, etc. the cores are returned to the oven for further baking so that they are thoroughly dry before use.

One noticeable feature of magnesium casting production is the wide use of chills in both cores and molds. Those, of course, are employed to obtain directional solidification. In some cases as many as 80 chills are used in a single mold. The chills are gray iron since molten magnesium does not react with iron, and both plain and contour types are employed. Faces of the chills may be smooth or scored for venting purposes. The latter type usually are used on surfaces that are to be machined, and where the surface area of the chill is large, or a number of chills are placed closely adjoining. As might be expected collecting, cleaning, sorting and distributing the chills requires the time of several men. All chills are marked with the part number and the core chills with both the part number and the box number. After use the chills are abrasive blasted to insure cleanliness.

In founding magnesium the most vital essential is to fill the mold cavity with the minimum turbulence since the oxide skin or film formed on the molten metal must not be broken and carried into the mold nor must entrapped air be carried in. The oxide film has about the same specific gravity as magnesium, and hence is not separated easily. The entrapped air likewise does not escape, and tends to form bubbles just under the skin of the casting. Consequently, the practice at the American Magnesium Corp. is to employ (*Please turn to page* 177)

Fig. 8—*Castings being removed from chrome pickle bath. Pickling prevents surface corrosion. Fig.* 9—*Filing end of small casting to remove burr. Fig.* 10—*Grinding and polishing a magnesium casting under a hood which disposes of the fine metal particles and eliminates fire hazard. Fig.* 11—*Testing a crankcase casting for leaks by immersion in water*



A-F-A Plans Program on foundry war production conference

A COMPREHENSIVE series of papers and discussions on many special castings' production problems related directly to the war effort will feature the three-day Foundry War Production Conference of the American Foundrymen's Association to be held April 28, 29 and 30. The sessions also will deal with developments in castings' production and metallurgical fields. The headquarters and meetings will be at the Hotel Jefferson, St. Louis, where D. P. Forbes, Gunite Foundries, Rockford, Ill. will preside at the opening meeting on Wednesday morning, April 28th.

While four special sessions will feature speakers of outstanding national prominence in business and industry, the remaining time will be given over to group discussions and the presentation of technical and practice papers covering all branches of sand castings, magnesium, gray cast iron, aluminum, steel, brass, malleable cast iron, and bronze. In addition patternmaking, foundry cost methods, sand research, safety and hygiene, foreman training, apprentice training and refractories will be discussed in their relation to the war efforts of the foundry industry.

The Pattern Division, the Aluminum and Magnesium Division, and the Malleable Division will hold all sessions on the first and second days, with the Steel and the Brass and Bronze Division concentrating sessions on the second and third days of the congress, with the Gray Iron Division and the general interest sessions being scheduled for all three days.

Because of the need to conserve time, evening meetings will be held and these will be given over largely to the shop practice courses, thereby providing an opportunity for the many shop men of the large number of the St. Louis foundries to participate.

The Aluminum and Magnesium Division under the chairmanship of Dr. N. E. Woldman, Eclipse Aviation division, Bendix Aviation Corp., will sponsor a technical session and a round table discussion with a shop course session on Sand Control Practices. Subjects of papers for the technical session listed are: "Recommended Practices for Magnesium Foundry Alloys"; "Recommended Practices for Aluminum Foundry Alloys"; "Chemical Analyses of Sands for Magnesium Castings"; "Thermal Gradients in Molds and Cores for Magnesium Alloys," and "Recent Production Improvements in Magnesium Melting and Aluminum Ladle Preheating Through Direct Radiant Gas Firing."

The Malleable Division under the chairmanship of A. M. Fulton, Northern Malleable Iron Co., Minneapolis and through its program committee under the chairmanship of Carl F. Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., has planned to devote its attention to malleable melting practices, the papers of which will compose a symposium under the following headings: Introduction; Air Furnace—Pulverized Coal Fired; Melting with Fuel Oil in the Air Furnace; Air Furnace—Cupola Duplexing; Cupola—Electric Duplexing; Cupola Melting for Malleable Fittings; Open Hearth Melting; Bracklesburg Furnace Melting; Refractories Practices for Malleable Furnaces, and Practical Points in Malleable Melting. An outstand- (*Please turn to page* 169)

Using lower grades of Brass and Bronze Castings

By CARTER S. COLE
Metals Section, Specifications Branch
Conservation Division
War Production Board
Washington

REAL conservation can be effected by specification changes based on a critical engineering examination of end use. The primary objective of that work is a better utilization of available material for maximum efficiency in the war effort. Numerous L and M orders of the WPB have shut off copper, tin and other scarce materials from nonessential civilian purposes. Even with this, taking the picture as a whole and more specifically referring to the primary metals, we do not have sufficient amount of these materials for our direct and indirect military needs and for items directly concerned with health and safety.

When copper, tin and other metals were cut off from their civilian uses, some of the normal channels in which these materials regularly flowed were closed. As a result lower grades of secondary material are relatively much more available than primary metals. Brass mill scrap on the other hand has been routed back to the brass mills for reprocessing. In normal times, copper clippings and similar high purity scrap were used to sweeten, or upgrade, casting alloys. So the ingot makers and the foundrymen have had to work with materials having higher impurities than those to which they were accustomed.

In this connection specifications have been carefully reviewed by Army, Navy, and federal specification committees, the American Society for Testing Materials, and the Society of Automotive Engineers. Others, too, have co-operated, including many of the larger industrial companies that write their own specifications. In liberalizing specifications, requirements for virgin metal have been removed, impurity limits have been raised, and specifications for new alloys written so that material currently available could be used to better advantage. The materials engineer thus has given the designing engineer the tools with which he may work. It is the designing engineer's responsibility from here on to make use of these tools in the most effective manner possible. The accompanying chart can serve as a guide and the table gives a ready cross-reference to the applicable approximately equivalent specifications.

The chart shows most of the important specifications grouped in columns according to the material required by an ingot maker or foundryman. Four classifications are given. *All New Metal* includes No. 1 and 2 copper as well as electrolytic. *High Purity Secondary* is exemplified by such items as fired cartridge cases currently used to make regular manganese bronze. In any specification where the lead is equal to or greater than the tin, the tin content of bronzes generally can be introduced into the alloy from (*Please turn to page* 168)

DOWN-GRADING CHART FOR BRASS AND BRONZE CASTINGS
SHOWING SPECIFICATIONS AND MATERIAL REQUIREMENTS

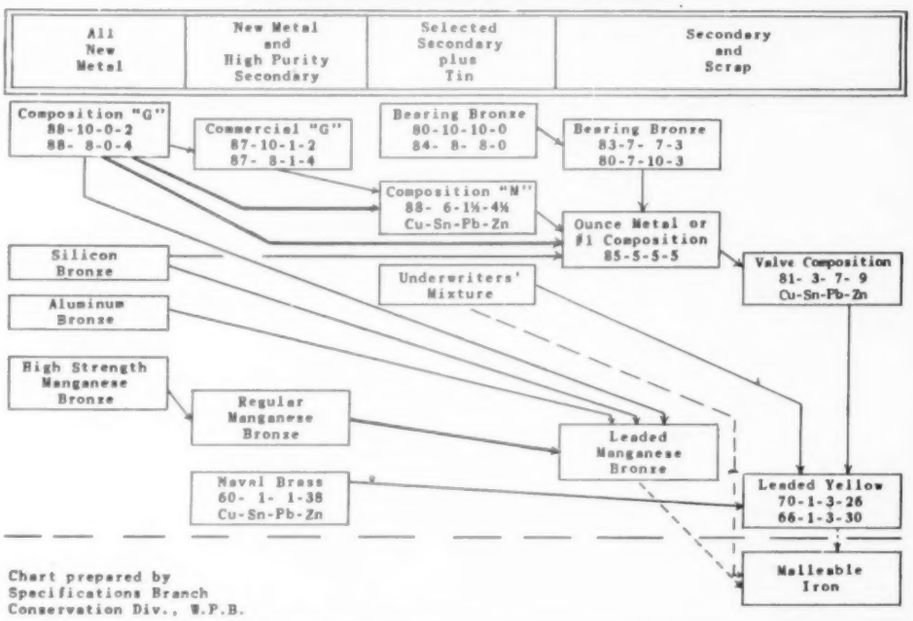

All New Metal
New Metal and High Purity Secondary
Selected Secondary plus Tin
Secondary and Scrap
Composition "G" 88-10-0-2 88- 8-0-4
Commercial "G" 87-10-1-2 87- 8-1-4
Bearing Bronze 80-10-10-0 84- 8- 8-0
Bearing Bronze 83-7- 7-3 80-7-10-3
Composition "M" 88- 6-1½-4½ Cu-Sn-Pb-Zn
Ounce Metal or #1 Composition 85-5-5-5
Valve Composition 81- 3- 7- 9 Cu-Sn-Pb-Zn
Silicon Bronze
Underwriters' Mixture
Aluminum Bronze
High Strength Manganese Bronze
Regular Manganese Bronze
Leaded Manganese Bronze
Naval Brass 60- 1- 1-38 Cu-Sn-Pb-Zn
Leaded Yellow 70-1-3-26 66-1-3-30
Malleable Iron

Chart prepared by
Specifications Branch
Conservation Div., W.P.B.

SPECIFICATIONS					
ALLOY	ASTM	ARMY & FEDERAL	NAVY	AMS	SAE
Composition "G"	B 143, 1A & 1B B 60	QQ-B-691a - 5	46M 6g "G"	4845 A	62
Commercial "G"	B 143, 2B E-B 143, 2X	QQ-B-691a - 6	46B 5h "P-c"		
Composition "M"	B 143, 2A B 61	QQ-B-691a - 1	46B 8g "M"		
85-5-5-5	B 145, 4A B 62	QQ-B-691a - 2	46B23c "Ox-c"		40
81-3-7-9	B 145, 5A	QQ-B-691a -11	46B24d		
80-10-10	B 144, 3A			4842	64
84- 8- 8	E-B 144, 3Y	QQ-B-691a - 8	46B22d "II"		
83- 7- 7-3	B 144, 3B	QQ-B-691a - 12			660
80- 7-10-3	E-B 144, 3X				
Naval Brass	B 146, 6C	QQ-B-621 - A	46B10f "N-c"		
70- 1- 3-26	B 146, 6A E-B 146, 6X & 6Y	E-QQ-B-621 X & Y	46B11 (Int.)		
66- 1- 3-30	B 146, 6B	QQ-B-621 - B	46B11 (Int.)		41
Silicon Bronze		QQ-C-593	46B28 (Int.)		
Aluminum Bronze	B 148, 9A & 9B	QQ-B-671a	46B18c		68
Underwriters' Mixture		WW-C-621a	34F 3c		
H. S. Manganese	B 147, 8B	QQ-B-726b B & C	46B29 "MA-c"	4862	
Regular Manganese	B 147, 8A	QQ-B-726b - A	49R 3e "Mn-c"	4860	43
Leaded Manganese	B 147, 7A	QQ-B-726b - D			

NOTE: Specifications, as shown, are approximately equivalent but may not in all cases be interchangeable for procurement and inspection.

MAKE PISTON RINGS for WAR MACHINES

By PAT DWYER

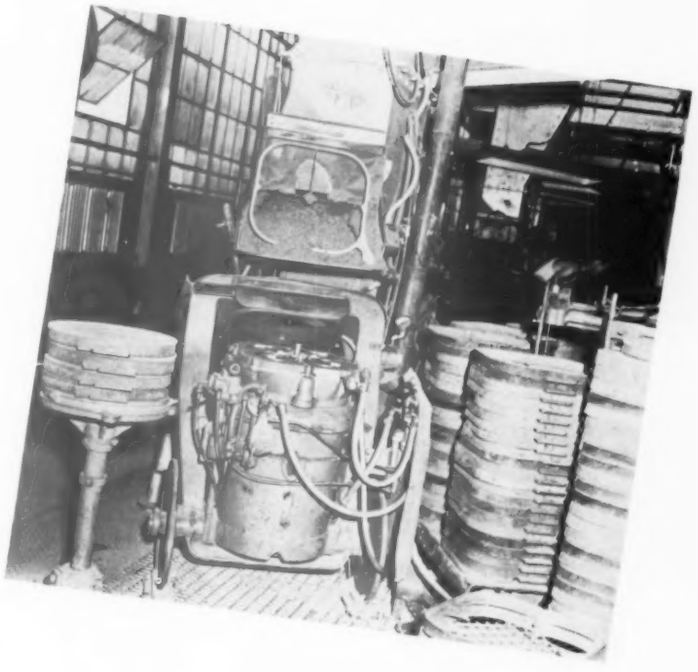
ESTABLISHED in 1895 and operating under various titles in succession as the line of products was changed, the present title the Perfect Circle Co., was adopted in 1927 with head office and machine shops in Hagerstown, Ind. In that same year a building on the outskirts of New Castle, Ind., was acquired and equipped for the production of cast iron piston ring castings in sizes from 1 to 9 inches in diameter and in almost infinite numbers. For some time the entire production in common with nearly all fabricated materials has been pouring into the voracious hopper of the war machine set up on the solid foundation of the U. S. A. and geared to run at top speed day and night until the war drum throbs no longer and the battle flags are furled.

The plant was described in the Dec. 1, 1931 issue of THE FOUNDRY as an outstanding example of what scientific control, adequate equipment and modern methods of production can accomplish in turning out gray iron castings to meet the most exacting specifications and microscopic tolerances in dimensions and physical properties. At that time any reference to further improvement would fall into the general classification of gilding refined gold, or attempting to paint the lily. Nevertheless improved methods have been incorporated occasionally and a fairly generous dash of gilt and paint have been applied during the past year. The plant has been enlarged and extended. The entire layout has been redesigned. New equipment has been installed to a considerable extent for preparing and distributing the sand, for conveying the molds and for operating the cupolas.

Under former conditions the molds were made, poured and shaken out on the second floor, and the castings were cleaned, inspected, machined and prepared for shipment on the first floor. Shallow molds were stacked 20 high and set up on long rows on the floor. Under the new arrangement the molds are made, poured and shaken out on the first floor. The main or central part of the second floor now is the charging floor for a battery of five cupolas. Part of the remainder of the floor is equipped as a jobbing shop for the production of miscellaneous castings, including patterns and castings required in the general maintenance of the plant. An extension to the floor at one end is occupied by the laboratory equipped with all necessary modern apparatus for testing raw materials and finished product.

A basement under the greater part of the building is utilized principally for the storage of sand and other materials. Shakeout and spilled sand from the main floor falls through gratings on to transverse belts which carry it to a longitudinal belt which in turn delivers the sand to an elevator and eventually to a large storage hopper. Before it enters the elevator new sand is added in definite amount to compensate for loss. Water sprays above the main belt add sufficient moisture to cool the sand and restore

Fig. 1 (Left)—Battery of molding machines is set up in a long straight line separated by a wide concrete gangway from the foundry wall. Fig. 2 (Above)—Oval conveyor units carry the molds to the pouring stations. Fig. 3 (Right above)—Stack of molds is picked up by the top of the sprue and swung over the grating in the background. Fig. 4 (Right below)—Squeezer type molding machines incorporating several special features are used for making molds



it to an almost workable condition. At a later stage in the reconditioning process the moisture content is adjusted accurately. Sand from the storage hopper is delivered in measured batches to two muller type mixers equipped with automatic devices for adding water and any necessary binding material. The process of loading, mixing, and unloading is controlled automatically, mechanically and continuously. A record board with colored lights, reflected in a glass on the opposite wall enables the attendant to maintain close control of all operations and to instantly apply any necessary remedial measure when the program for any reason may be interrupted temporarily.

Prepared sand from the mixing station is fed to a long elevated belt above a row of hoppers which supply sand to the battery of molding machines. An automatic tripping device on each hopper actuates a plow on the belt. When the hopper is filled, the plow is raised and the sand flows on the belt to the next hopper in line. In a laboratory near the mixing station, sand is tested at regular intervals to maintain uniform quality essential to the production of delicate castings in which the slightest variation in material or practice will send the product to the scrap pile. Standards include moisture 4 to 4.5 per cent, grain size 150 and green strength 6, dry strength 29, clay content 9 per cent and permeability 20, flowability 85, deformation 0.012.

The entire battery of molding machines is set up in a long straight line separated by a wide concrete gangway from the west wall of the foundry. The machines are of the squeezer type in which several special features have been incorporated through experience and ingenuity of the management. Special features include a pneumatic device for moving the squeezer head to the on or off position, a pattern heating unit and an air-operated arrangement for moving the stripping pins and the sprue up and down. Machines are arranged in pairs, back to back with a single sand hopper supplying sand through two openings. Since all the units are alike a more or less detailed description of one will be sufficient. Many of

the features are shown in the accompanying illustrations.

Cast iron patterns are mounted individually in heavy cast iron plates in groups of 2, 4, 6 or 8, depending on the size and the maximum distance iron will flow. The flasks in which the molds are made conform closely to the manner in which the patterns are grouped around a central sprue. Only two size flasks are used, a large square flask of 1¼-inch depth, and a smaller round flask 1⅛ inches deep. Each is provided with lifting handles on opposite sides, and with two guide pin holes. Molding machines are adaptable to either size of flask. All flasks of a given size and shape are interchangeable. The mold sections are stacked 20 high for pouring and each section, with the exception of the bottom and top, serves as both cope and drag.

Molds Are Stacked

In operation the molder places the shallow flask and sand frame on the machine, fills it with sand from the hopper chute, moves the squeezing head forward and opens the valve which raises the mold against the squeezing head. With an almost instantaneous movement the mold is lowered, the squeezing head is swung back out of the way, the sprue pattern is pulled downward and a number of pins on the perimeter raise the flask clear of the patterns. The molder lifts the flask off the machine and places it on the stack of molds on the conveyor. The sprue hole in the first or bottom section is plugged. In the others it is left open to form a continuous passage for the metal from the top to the bottom of the stack. The flat, smooth top of each mold section serves as the drag for the section above. The top section which contains no ring impressions is made on another machine by an operator who keeps several molding units supplied. The top section has an elongated opening in the center to serve as a pouring basin.

Each oval conveyor unit, made up of a number of low trucks mounted on 6-inch diameter wheels, extends 100

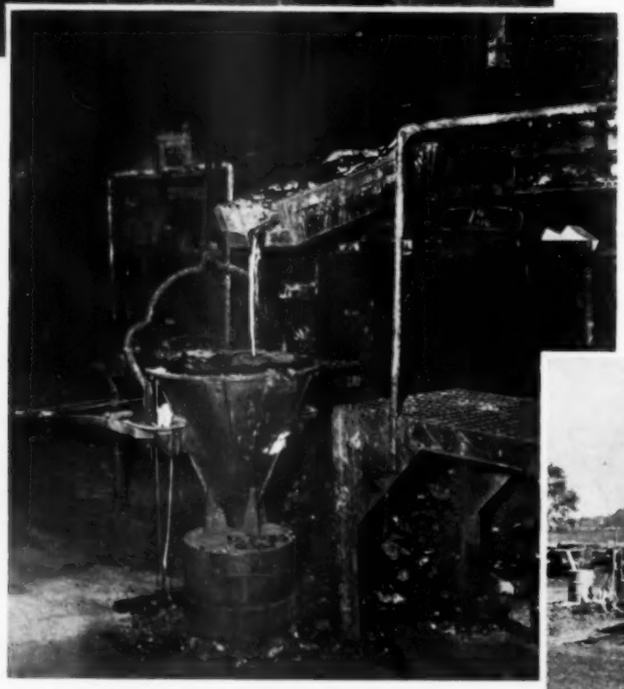


Fig. 5 (Left above)—Operator strips rings from gate and sprue by single stroke of his gloved hand. Fig 6 (Left below)—Slag from cupola falls into a small conical cast iron pot. Fig. 7 (Below)—Cupola in yard is used to convert light scrap into pig iron. Fig. 8 (Right)—View of the sand testing laboratory. Fig. 9 (Extreme right above)—Some of the patterns used in making molds. Fig. 10 (Extreme right below)—Mold and cores for making test pieces

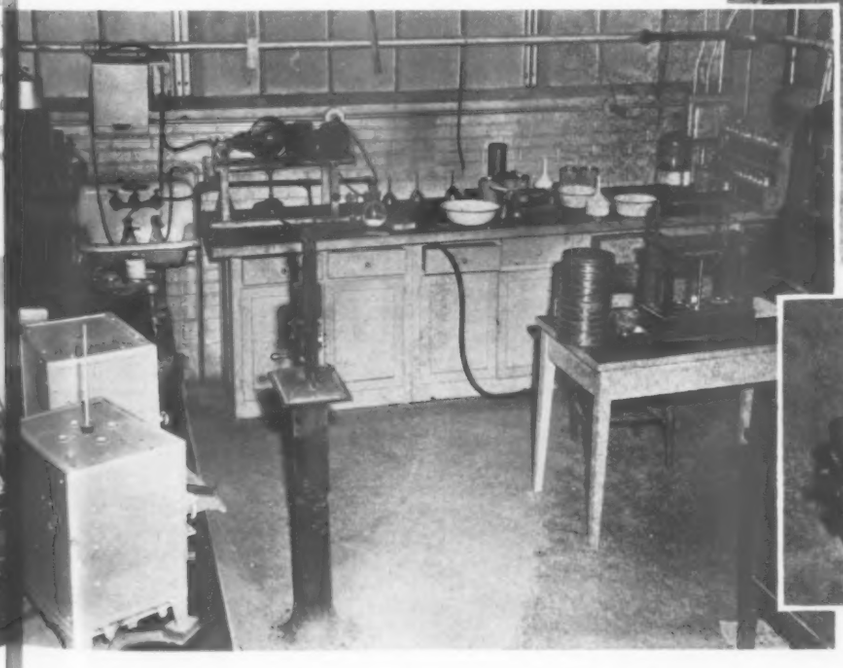
feet across the floor from the molding station to a wide gangway which parallels the battery of five cupolas. After each stack of molds is built up the train is moved forward one car length. Obviously exceedingly hot metal is required to pour the castings. It is taken direct from the cupola spout in 200-pound capacity ladles suspended from a monorail which through suitable switches serves all the conveyor units. With the exception in size of the ladles, the technique is similar to that practiced in stoveplate and light gray iron foundries where the molders line up on each side of the cupola spout and catch under the constant stream with hand ladles. In the present instance the shank extends only from one side of the ladle and is suspended from the crane hook by a curved bail at the inner end which equalizes the weight when the ladle is full or empty. A single operator manipulates the ladle with one hand on the outer end and the other hand on a lever handle. The spout is shaped like that on a pitcher to deliver a small narrow stream of metal into the pouring basin. A hinged cover conserves temperature of the metal in transit. While under the cupola spout the cover is pulled back by a small chain and held in position by a small counterweight ball.

Castings Stripped From Gates

Molds are filled with metal while on the first leg of the oval conveyor. They then move forward, around the turn and travel in the opposite direction on the second leg. Shortly before arriving at the molding station they are removed and shaken out. A small hoist and grab hook lifts the stack by the top of the sprue and swings it to a point over a grating where the load is vibrated. The flask sections drop off and the sand falls through the grating on to a belt, the first step in the preparation and reconditioning process. The operator then swings the sprue and castings over a steel drum where the castings are removed from the sprue with magical swiftness. The operator rubs his gloved hand from the top to the bottom. Just one pass for each row and the rings are in the container. The sprue and stumps, somewhat resembling the back bone of a codfish, is tossed into another container destined for the cupola charging platform. The flask sections are stacked on the conveyor within easy reach of the molder. An air exhaust system removes the dust at the shakeout station. Individual casting containers form part of the system for recording the work of each molder, and for recording the history of each casting.

Many problems involved in the development of a satisfactory gating system for these delicate castings had to be worked out partly by theory based on experience and partly through the old reliable foundry method of trial and error. Even at present, with all the bugs practically eliminated, the yield of castings in proportion to the amount of metal poured into the molds is as 1 to 3. That is for every 100 pounds of metal melted, only 25 pounds become a salable product. The remainder, 75 pounds become sprue, gate and runner to be thrown back into the cupola.

Extent to which light castings are sensitive to slight change in temperature was shown in some of the early experimental work where a short arc of the ring opposite the gate was harder than the remainder of the casting. A miniature blind riser, facetiously known as a pollywog and attached to the casting at this point solved the problem. Apparently the two streams of iron flowing around the ring and meeting at the central point, cooled off more rapidly than iron in the remainder of the ring and held more carbon in the combined (*Please turn to page* 179)



HIGH TEST IRON

By A. P. ALEXANDER
Chicago

AT THE present time gray iron foundries can be of great assistance by replacing parts such as lathe spindles, drawing and forming dies, crankshafts and miscellaneous machine parts, now being fabricated in steel. To obtain low carbon irons for these applications it is customary to use a high percentage of steel in the charge, and since the average foundry is not accustomed to this, very little effort is being made to replace such fabricated steel with high test castings.

Fortunately, production of 50,000 to 60,000 pounds per square inch iron is not difficult. The many high test irons on the market merely prove that its production permits many variables, and *is* basically very simple. The fact that most of the foundries engaged in such production are running at capacity, demonstrates that there is an increasing need for this type of iron.

Most high test irons are merely irons that would possess a white fracture if cast as they come from the cupola, but by adding a graphitizer at the spout, they are made gray and machinable in the casting. To manufacture this type of iron it is only necessary to observe rules for economical production of good gray iron. Since deviations from these simple rules will impair final quality, they will be reviewed in as practical a manner as possible. Simplification will be attempted in order that the busy foundryman easily can use these data to meet his conditions.

Check Factors Daily

The cupola, of course, is standardized. However, other melting factors are variables, and must be checked daily. A permanent record of them should be kept. A suggested form for this is illustrated in Fig. 7.

It is preferable to have a cupola diameter of at least 36 inches. Any size cupola can produce high test irons but there is danger of bridging in a smaller cupola when large gates and risers, necessary in low carbon irons are remelted.

Tuyere area should range from 20 to 25 per cent of the cupola area. The tuyeres must be approximately 20 inches from the base plate. If too high there is danger of picking up excessive carbon.

It is imperative that the bottom of the charging door be approximately 18 *feet from the base plate*, or high enough to hold from 4 to 5 *normal* charges in the stack. That is necessary for high steel mixes, which will melt cold if not sufficiently preheated. The author remembers a foundry where an attempt was made to melt 25 per cent steel mixes in a cupola holding only two normal charges in the stack. Iron froze in the well.

Design of tap hole and spout, and that of the slag hole, where one is needed, is entirely dependent on the amount of metal melted and method of tapping. Air supply should receive attention. The cupola must be equipped at least with a constantly used pressure gage, and all connections between blower and cupola should be checked. It is wise to have a volume indicator attached to the blast pipe. Where sufficient amounts of iron are melted daily, an air control unit proves economical.

Usually 48 inches is a satisfactory bed height for a 48-inch cupola, but this will vary depending on the coke and type of iron melted. Bed height and condition can be checked by timing the first drops of metal passing the peephole. If the first drops are seen approximately 4 *minutes after* the blast is on, the bed has been prepared properly.

Prepare Coke Bed

Lighting can be done either by an oil torch or by kindling wood. If lit with kindling the method shown in Fig. 3 may prove useful. Here coke is placed on the bottom as illustrated, then flat boards are placed upon it. A floor is built on these. Using this as a base, an inverted cone is built with kindling. Scrap paper and wood is placed into this cone. Kerosene is poured upon this, and the whole lighted. After lighting, two-thirds of the coke is added. When this settles the remaining coke is placed into the cupola. By keeping kindling off of the bottom no charred wood remains on the sand, and there is less chance of chilling the first iron.

It is important that the bed be heated uniformly. If it is noted that one part is hotter, tuyere openings opposite that part should be closed until the bed is again of an equal temperature. Any bridging should be eliminated by frequent poking. When the surface coke in the last layer reaches a red heat, and the crevices are white hot, the bed should be poked thoroughly again. Then it is built up to the predetermined level with required additional coke, and charging *immediately commenced*.

Sometimes it is necessary to use the blast to speed heating of the bed. This should not be required with good practice, but if it becomes necessary the blast should not be on for more than ½ to one minute.

Very good melting has been obtained with coke split heights of 6 inches. Knowing this, and that one pound of coke occupies approximately 65 cubic inches of space,

Fig. 1—Correct weights of air for varying coke splits. Fig. 2—Small amount of inoculant has great graphitizing power. Fig. 3—Method of placing kindling wood to ignite cupola bed. Fig. 4—Spout built with series of steps. Fig. 5—Recommended sizes of wedges. Fig. 6—Appearance of several cast wedges which have been broken

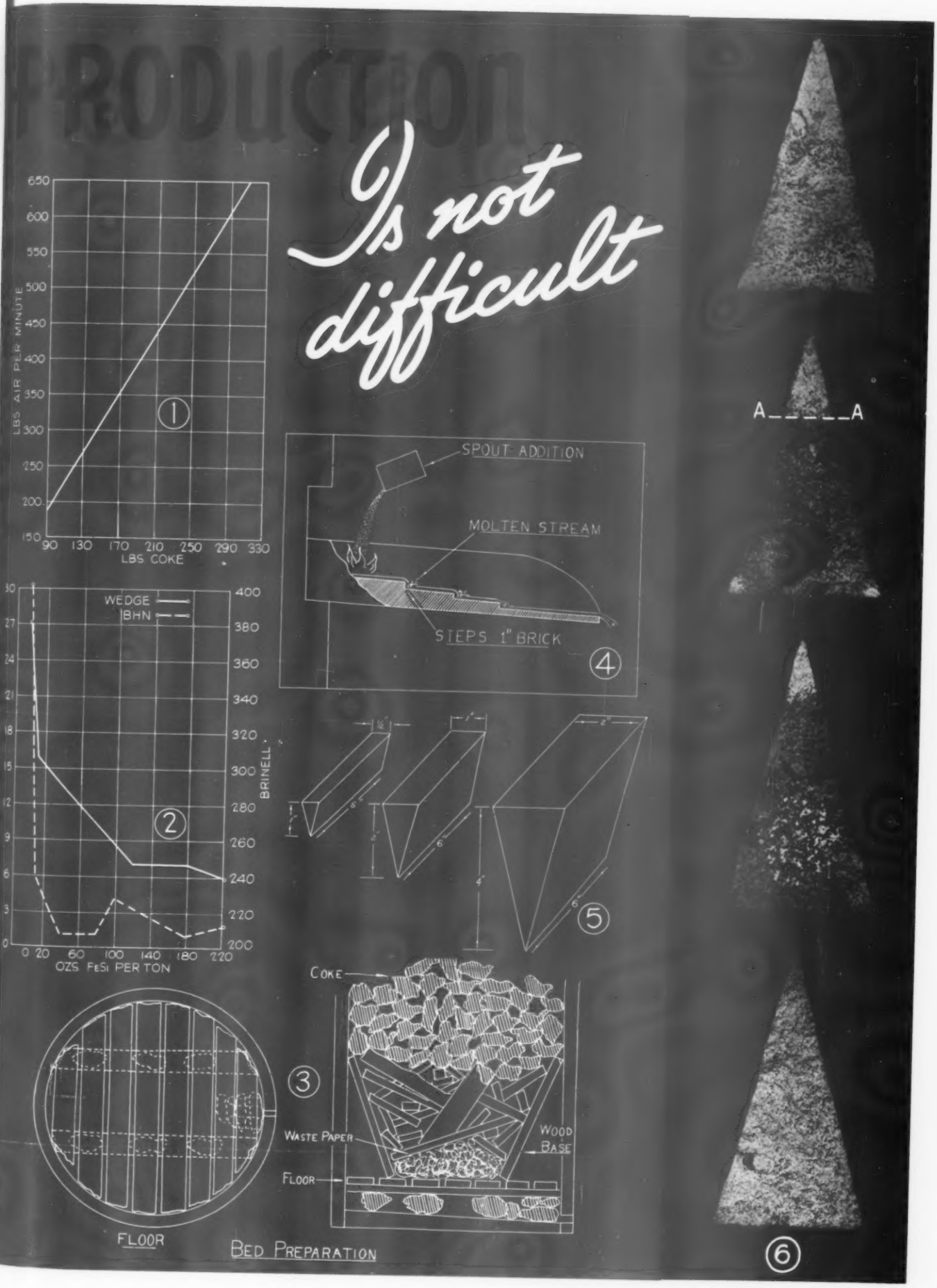

PRODUCTION
Is not difficult
LBS AIR PER MINUTE
650
600
550
500
450
400
350
300
250
200
150
90 130 170 210 250 290 330
LBS COKE
1
WEDGE
BHN
BRINELL
400
380
360
340
320
300
280
260
240
220
200
0 20 60 100 140 180 220
OZS FeSi PER TON
2
SPOUT ADDITION
MOLTEN STREAM
STEPS 1" BRICK
4
5
COKE
WASTE PAPER
WOOD BASE
FLOOR
3
FLOOR
BED PREPARATION
A_____A
6

Table I

Percentage Calculation Form

SHEET NO. 1
DATE July 14, 1942

	Si	Mn	P	S	%	Si	Mn	P	S
Steel	0.10	0.40	0.040	0.040	70	0.070	0.280	0.028	0.028
Silv. Pig	10.40	2.00	0.120	0.015	8	0.832	0.160	0.010	0.001
Mall. Pig	2.50	1.35	0.200	0.015	4	0.100	0.054	0.008	0.001
Returns	1.30	0.80	0.150	0.100	16	0.208	0.128	0.024	0.016
Spiegel	1.00	20.00			2	0.002	0.400		
Total					100	1.212	1.022	0.070	0.046
Approximate Melting Loss						—5%	—15%		+0.4%
Final Calculated Analysis						1.150	0.87	0.070	0.086

Remarks.

Table II

Section—Composition Data Sheet

	¼ To ½	½ To 1	1 To 3
Section—inches	¼ To ½	½ To 1	1 To 3
Total carbon %	3.15-3.20	3.00-3.15	2.90-3.15
Silicon %	1.70-1.90	1.40-1.60	1.00-1.40
Manganese %	0.60-0.80	0.70-0.90	0.85-1.00
Phosphorus %	0.20 max.	0.15 max.	0.15 max.
Sulphur %	0.12 max.	0.10 max.	0.10 max.
Nickel %	0.50-1.50	0.50-1.50	0.50-1.50
Steel %	15	50	70
Pig iron %	10-15	15	12
Return scrap %	30-50	15	16
Purchased scrap %	20-30	19	
Spiegel or FeMn %		1	2
Base wedge—inches	6-8/32	20-25/32	25-35/32
FeSi ozs. per ton	20-40	50-100	20-80
Final wedge—inches	2-3/32	5-8/32	8-20/32
Transverse—pounds 1.2" dia. x 18"	2,700- 2,900	3,000- 3,200	3,200- 3,800
Tensile p.s.i.	40,000-45,000	45,000-50,000	50,000-60,000

Table III

Weight Calculation Form

SHEET No. 1
DATE July 14, 1942

	Weight	Silicon %	Silicon lb.	Manganese %	Manganese lb.	Phosphorus %	Phosphorus lb.	Sulphur %	Sulphur lb.
Steel	1,050	0.10	1.050	0.40	4.200	0.040	0.420	0.040	0.420
Silv. Pig	120	10.40	12.480	2.00	2.400	0.120	0.144	0.015	0.018
Mall. Pig	60	2.50	1.500	1.35	0.810	0.200	0.120	0.015	0.009
Returns	240	1.30	3.120	0.80	1.920	0.150	0.360	0.100	0.240
Spiegel	30	1.00	.300	20.00	6.000				
Total	1,500		18.450		15.330		1.044		0.687
Per Cent		1.23		1.02				0.046	
Approximate Loss			—5%		—15%		0		+0.4%
Final Analysis		1.17		0.87		0.070		0.086	

Remarks.

suitable weights of coke for various cupolas can be calculated easily by multiplying the cross sectional area by the height and dividing by 65. The following calculations indicate the procedure:

πr^2 = area of circle

48 inch = cupola diameter

$$\frac{3.14 \times 24 \times 24 \times 6}{65} =$$

165 pounds of coke

The proper metal charge can be determined merely by multiplying coke by the ratio desired;

$165 \times 9 = 1485$ pounds of metal

Charges of 1500 pounds are used ordinarily for convenience.

High steel mixes require additional coke to compensate for their lack of carbon. With a mix of 50 per cent steel, containing only 1.60 per cent total carbon, and a final analysis of 3.10 per cent total carbon, the following would be true;

3.10 per cent total carbon in final analysis
1.60 per cent total carbon in mix

1.50 per cent total carbon picked up

$1.5 \times 1500 = 22.5$ pounds carbon from coke.

Coke contains 90 per cent carbon so:

$22.5 \div 0.9 = 25$ pounds additional coke required

$165 + 25 = 190$ pounds total coke required

One of the most important yet most abused melting factors in average foundries is air supply. An insufficient amount will produce slow melting with excessive carbon and sulphur pick-up, while an excessive amount will lead to oxidized iron. Fig. 1 graphically indicates correct weights of air for varying coke splits.

To convert weight into volume merely multiply by the necessary factor. Factors for varying temperatures and atmospheric pressures can be (*Please turn to page* 181)

Fig. 7—Suggested form for keeping permanent daily record of various phases of cupola operation

⑦ HEAT NO. 1 BED 48" BLAST 4600 DATE July 15, 1942
BAROMETER 29.92 PRESSURE 12
TEMPERATURE 82°

SHEET NO.	CHARGE	COKE	APPLICATION	ANALYSIS Actual - Below Si	Mn	TC	P	S	Ni			FeSi OZS PER TON	WEDGE AIM	WEDGE GOT	CHILL	TAP NO.	WEIGHT	REMARKS & PHYSICALS
3	1500		Housing - Smith Inc.	1.65	.70							30	2-3	2		1	3000	4" first drop - Iron hot
		180		1.60	.65	3.35												
3	1500		" " "															
		180																
1	1500		Gears - T.H. Jones	1.17	.87													
		195	Cams - Mathew Corp.	1.17	.87	3.05			.74			100	4-6	5		2	800	3,450 tram .35 defl.
																	700	52,000 p.s.
1	1500		Dies - Brown Prod.															
		195		1.17	.85	3.10			1.25			.30	10-12	10		3	800	225 - BHN
																	800	

Steel Founders' Society Holds Largest Meeting

CONSIDERATION of various problems arising from the war effort, a panel discussion on the centrifugal casting of steel, and reports of society activities were featured at the annual convention of the Steel Founders' Society of America held Feb. 10 and 11 at the Edgewater Beach Hotel, Chicago. The meeting was the largest in the history of that organization, with over 300 foundrymen from member companies participating in the two-day session.

An exceptional amount of interest developed in the panel discussion on the production of steel castings centrifugally, with six speakers comprising the panel. Charles W. Briggs, technical and research director, Steel Founders' Society, acted as chairman, and in opening the meeting outlined some of the developments which have been made in the centrifugal steel castings process. While the first patent covering the manufacture of a metal object by spinning the mold was granted in 1809, most of the developments have taken place during the past 20 years. Mr. Briggs stated that the American Steel Foundries began the casting of car wheels centrifugally in 1902. In 1930, the Watertown Arsenal cast guns centrifugally of a molyvanadium steel, the mold being made of cast iron. The speaker pointed out that the Watertown Arsenal has been a leader in the development of casting steel centrifugally.

OLIVER E. MOUNT

Recipient of the Lorenz Memorial Medal for conspicuous service to the steel foundry industry

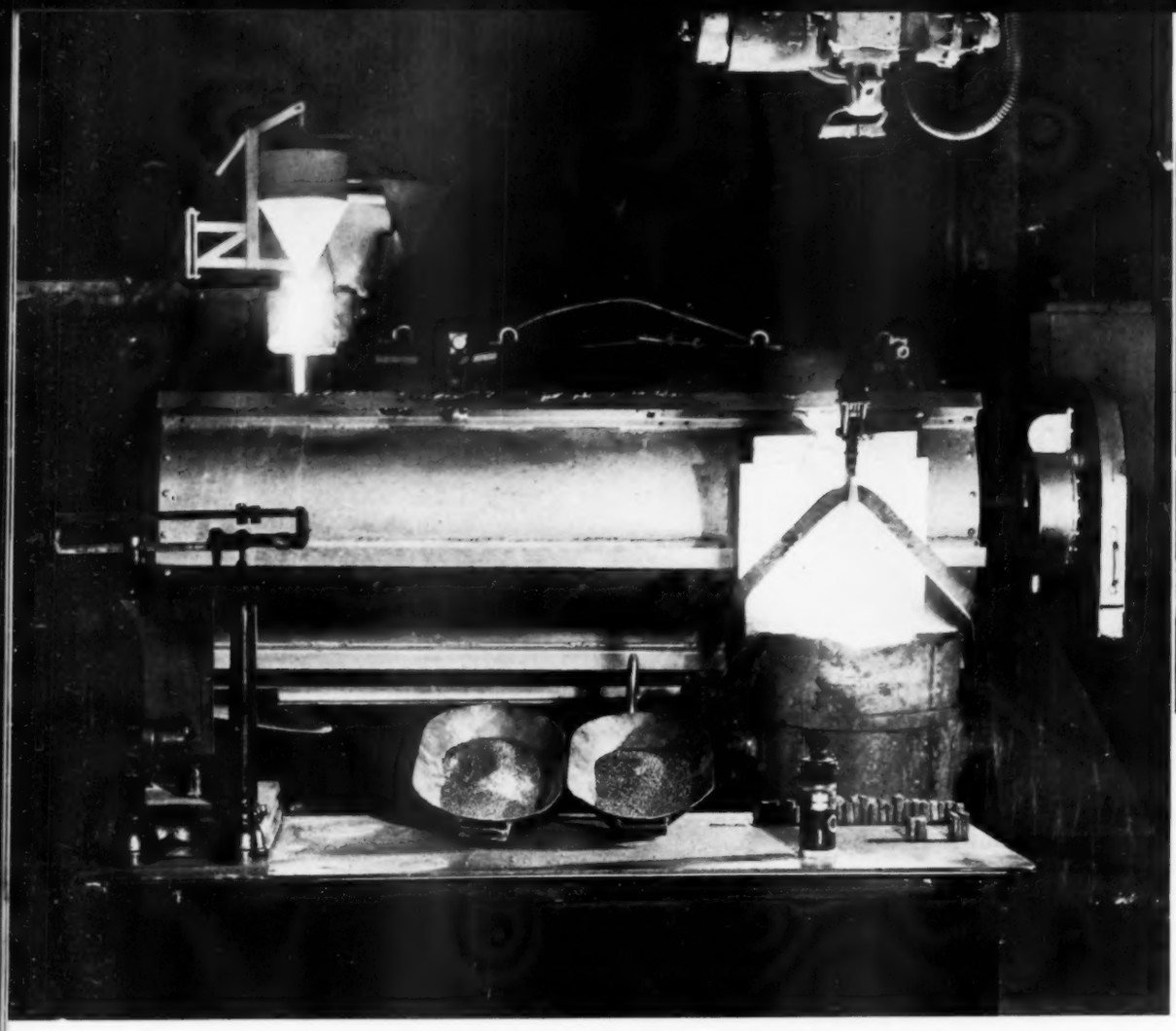
Continuing the history of centrifugally casting, Mr. Briggs stated that miscellaneous gear castings have been produced centrifugally for the past 17 years by the Sawbrook Steel Castings Co., and that starting 16 years ago the National Malleable & Steel Castings Co., has been producing cast street car wheels centrifugally. High chrome and nickel tubing has been produced by the Ohio Steel Foundry Co. The Ford Motor Co. brought the centrifugal process to a high degree of perfection in recent years in the production of gears and other castings by that method. In 1942, fourteen members of the Steel Founders' Society of America were producing centrifugal castings in machines using vertical type spindles, and eight employed equipment with horizontal type spindles.

Phases of the centrifugal castings process include: 1—Method of rotation; 2—Method of pouring; 3—Construction and form of the mold. Centrifugal castings may be divided into the following: True, or those cast about their own axis; semi or those cast in cores; and pressure or those cast in clusters about a center axis.

Mr. Briggs discussed the application of both horizontal and vertical spindles and gave some examples of castings produced by each method. He stated that the rotation speed is varied according to type, this variation extending from 50 to 1200 revolutions per minute. However, most speeds now in use for steel castings range from 150 to 300 revolutions per minute. Mr. Briggs pointed to the fact that yields of approximately 100 per cent can be obtained in the production of true centrifugal castings. In closing he stated that if a good static casting produced with directional solidification, and a good centrifugal steel casting produced in a sand mold were compared, the properties should be the same.

P. C. Power, Maynard Electric Steel Castings Co., Milwaukee, discussed the casting practice of that organization in a paper "Centrifugal Castings by the Use of the Vertical Spindle Machine." Mr. Power stated that the Maynard company uses 13 machines equipped with 36-inch tables and 13 machines having 48-inch tables. One of the 36-inch machines has a variable speed drive secured with a direct current motor, thus providing speeds of from 50 to 450 revolutions per minute. Variable speed is provided in one 48-inch machine by means of a speed reducer which provides speeds from 50 to 600 revolutions per minute. While the remainder of the machines are the constant speed type, variation may be obtained by pulley changes. Normally the 36-inch machines operate at 150 revolutions per minute and the 48-inch machines at 75 revolutions per minute. The 36-inch table will hold flasks 20 by 20 inches, 20 x 24 inches, and 28-inch round. The 48-inch table will accommodate flasks 20 x 20 inches, 24 x 24 inches, 28-inch round and 36-inch round. Flasks are standard equipment and molds are held on the machine by pins, which may be moved to accommodate changes in flasks.

Mr. Power explained that safety guards are employed on these machines. Metal is melted in a 1-ton acid electric furnace which melts about 1600 to 2300 pounds per heat. The metal is carried from the furnace to the molds in shank ladles or in bottom pour ladles. Where shank ladles are employed, the metal (*Please turn to page* 172)



Maintains Production of Quali

GRAY IRON foundrymen are faced with the double edged problem of maintaining production of high quality castings and of the scarcity of suitable raw materials. However, through the application of suitable equipment, and careful control, it is possible to surmount the numerous difficulties, and obtain iron of a uniform composition throughout the heat. That has been the experience of the Caterpillar Tractor Co., Peoria, Ill., and a great part of the success in attaining the desired results is attributed to use of the proper type receiving or mixing ladle shown in Fig. 1.

Raw materials employed by the firm cover a rather heterogeneous assortment, some of which are shown in the accompanying illustrations. They include for example, bundles made up of old fenders, baled wire, tin cans, etc. Another material is conventional carburizing pots which have made many trips in the furnace and have become quite scaled. However, when they are handled with a lot of common sense, they can be converted to good iron by melting in the cupola. Other materials include bundles with and without sheet metal wrappers containing nickel steel turnings which are salvaged primarily for their nickel content for special types of iron, and cast iron borings in briquet form.

Table I shows the results that have been obtained on the 10-ton receiving ladle shown in Fig. 1. The ladle was kept full during the period under observation by the procedure of withdrawing a ton of iron into the pouring ladle, and then admitting a ton of metal from the cupola. As each ton was drawn from the receiver, an arbitration test bar was poured, and as may be observed, the composition and physical properties did not vary greatly. Unfortunately, operations do not always permit those conditions to exist at all times since there may be a demand for several tons of special iron from one part of the shop and an immediate call for several tons for another part of the foundry. This, of course, results in severe draining of the receiving ladle.

Table II is a typical daily report maintained on the cupolas in operation. As may be noted the data include relative humidity at stated periods; tapping times with temperatures, weights of coke, rock, and air; cupola diameter at the beginning and end of heat; depth of the melting zone; melting rate, etc. The type of charge also is included, and as indicated was composed of 25 per cent pig iron, 25 per cent steel scrap, 35 per cent scrap iron such as gates, sprues, etc., and 15 to 25 per cent cast iron briquets as received during the day.

Fig. 1 (Left)—View of the elongated, cylindrical-type receiving ladle with a capacity of several tons. Fig. 2 (Top)—A scene which is not unusual in the present-day material yard in the rear of the foundry. Fig. 3 (Right)—A carload of conventional carburizing pots, badly scaled from use, which when handled with common sense can be converted into good iron by the cupola process. Fig. 4 (Above)—Carload of bundled old fenders, baled wire, tin cans, and what not

lit Castings

By FRANK W. SHIPLEY
General Superintendent
Foundry Division
Caterpillar Tractor Co.
Peoria, Ill.

Table I

Special Experiment

1E-18
Date cast 9-28-42

Ladle	T. C.	Mn	S	P	Si	Ni	Cr	Imp	Tens
1	3.22	.71	.150	.133	1.94	0.28	0.08	38.0	40,450
2	3.23	.70	.149	.134	1.93	0.29	0.08	39.0	41,600
3	3.20	.69	.148	.127	1.93	0.25	0.08	37.5	41,150
4	3.17	.73	.139	.127	1.95	0.32	0.08	39.0	40,550
5	3.18	.73	.142	.127	1.95	0.28	0.08	37.5	39,700
6	3.23	.72	.147	.123	1.96	0.27	0.08	36.0	39,750
7	3.19	.72	.145	.130	1.97	0.31	0.08	35.0	39,850
8	3.24	.72	.142	.113	1.96	0.27	0.08	38.0	39,550
9	3.21	.73	.147	.110	1.97	0.31	0.08	34.0	37,751

At end of heat, ten ton mixing ladle was full. As each ton was removed, successive arbitration bars were poured.

Table II

Typical Daily Report

Total Tonnage—310½ Cupola No. MF 3724

1E18 9-28-42

Relative Humidity: 6 a.m. 34 | 8 a.m. 38 | 10 a.m. 36 | 12 n. 34 | 2 p.m. 32 | 4 p.m. 50 | 6 p.m.

Tapped Out 7:30 Total Melt 198½ Coke Ratio 7.0 (Form No. 6)

Time	Temp.	Coke	Rock	Air	Time	Temp.	Coke	Rock (100) on	Air
7:30	2840	400	180	730	1:45	2900	750	3 chgs.	700
7:45	2830	800(300)	360	730	2:00	2910	750	150	700
8:00	2830	800	200	730	2:15	2910	750	150	760
4G-8:15	2810	800	200	720	2:30	2910	750	150	810
8:30	2820	800	200	730	2:45	2890	750	150	790
8:45	2820	800	200	720-4G	3:00	2900	750	150	760
9:00	2820	800	150	730-OG	3:15	2870	750	150	770
9:15	2840	800(300)	150	720	3:30	2880	750	150	770
9:30	2830	800	150	720	3:45	2900	750	150	770
9:45	2830	800	150	730	4:00	2870	750	150	700
10:00	2900	800	150	730	4:15	Wind Off.			
10:15	2900	800	150	730	Cupola diameter before heat, 67".				
10:30	2930	800	150	730	Cupola diameter after heat, 78".				
OG-10:45	2900	750	150	690	Melting zone, 50".				
11:00	2900	750	150	690	Average temperature, 2875°F.				
11:15	2890	750	150	680	Melting rate, 23.OT.				
11:30	2890	750	150	680					
11:45	2890	750	150	680	450 lbs. extra coke on 3, 6, 9, 11th chgs.				
12:00	2900	750	150	680	300 lbs. extra rock on 1st 4 chgs.				
4G-12:15	2910	750	150	690	X—marks 6000-lb. chgs.				
12:30	2880	750	150	700	Charging Mixture.				
12:45	Wind off 15 min. poured up.				Pig Iron, 25%.				
1:00	2870	750	150	680	Scrap Steel, 25%.				
1:15	2880	750	150	720	Scrap Iron, (Gates, Sprues, etc.) 35%.				
CG-1:30	2900	750	150	700	Cast Iron Briquettes, 15% (up to 25%)				

Bed Increase Causes Variation In White Iron Castings

We are melting 65 per cent steel and 35 per cent cast scrap in a 21-inch diameter cupola for the production of white iron castings. Charges consist of 300 pounds metal and 45 pounds coke. We are blowing approximately 30,000 cubic feet of air per ton of iron through five equally spaced 3-inch diameter tuyeres about 4 inches above the sand bottom. Pressure is 6 ounces. To secure hotter iron we recently raised the amount of bed coke from 210 to 240 pounds, but the iron no longer is uniform. Some of the castings are too hard, while others appear like gray iron. Do you think raising the bed with consequent raising of the iron temperature is responsible for the erratic composition.

Raising the temperature of the iron in the cupola should not affect the composition. We are inclined to the opinion that the shallow well in the cupola is responsible for your trouble. With the tuyeres only 4 inches above the sand bottom the well will hold only about 200 pounds before the cupola has to be tapped. Therefore you do not get a complete mixture from any one charge at any given time. You can adopt either of two methods to remedy the situation. Raise the tuyeres 2 or 3 inches so that you can collect 400 or 500 pounds in the well, or reduce the charge to 180 pounds, 120 pounds steel and 60 pounds gray iron scrap. With either method you will secure a more intimate and uniform composition.

Handling Monel Metal Differs Considerably from Bronze

We operate a nonferrous foundry and have melted practically all of the copper-base alloys. However, we have not had any experience with monel metal, and would like to obtain information on melting, mixing procedure temperature, etc. We have 3 gas-fired, tilting type furnaces taking No. 150 crucibles.

Molding of monel metal castings is similar to that employed for steel castings. Risers and shrink heads should be large to insure adequate feeding, and placed over those sections of the casting where feeding will be required. Sand should be open and refractory, and molds should be vented well to permit easy escape of gases. Molds for medium and heavy castings should be dried. Cores should be soft enough to collapse when the metal begins to solidify, but not so much so that they crumble or burn under the first impact of molten metal.

Scrap monel metal in the charge should be held to 25 per cent in the case of heavy scrap, and 10 per cent with light scrap. Raw material as supplied by the producer may be in ingot blocks or in the form of shot. With ingot approximately 1½ pounds of metallic silicon are added per 100 pounds about five minutes before it is ready to pour. With shot only ½-pound of metallic silicon is added since it already contains about 1 per cent silicon. The silicon is stirred in well with a wood pole or stick to insure proper solution. Just before pouring the alloy 1½ ounces of metallic magnesium per 100 pounds are added to deoxidize and desulphurize the metal. The magnesium should be placed in a phosphorizer or similar device so that it may be pushed and held beneath the surface until action ceases.

Melting should be performed as rapidly as possible since the longer the metal remains in the furnace, the greater the pick up of deleterious gases. Pouring temperature will depend as in the case of other alloys, on the section thickness of the casting. In general the pouring temperature will range from 2700 to 2750 degrees Fahr. However, in the case of light castings the temperature may go as high as 2800 degrees Fahr.

Steel Skimmers for Crucibles Have Too Short a Life

Our skimmers for raking the sides of crucibles, stirring and mixing metal and raking dross, have been supplied for many years by a local blacksmith shop. Recently the life of these skimmers has been of short duration. The skimmer is made up of ⅝-inch diameter steel rod 42 inches in length attached to a rectangular steel plate ⅜-inch thick, 3 x 6 inches. What is the best type of steel for a brass pot skimmer? Would you recommend stainless steel? How does the price compare with ordinary steel?

The blade of the skimmer is the only part subject to wear and if the question was one of resistance to abrasion we could see the advantage of a hard steel plate over one of a lower carbon content. However, in the present instance the wear or loss of metal is due to gradual absorption by the molten metal. For that reason the carbon content of the plate is a factor of minor importance. A possibility exists that the skimmer is used more extensively than formerly for stirring the metal in the pot and the metal may be at a higher temperature. The practice should be discontinued not only because it is unnecessary and wasteful of skimmer metal, but principally because the metal melted from the skimmer becomes incorporated in the bronze mixture. We see no particular advantage in providing such an elaborate skimmer.

In the majority of instances a rod flattened at the end, or a piece of strip steel ⅜ x 1½ inches and bent at the end after the fashion of a hockey stick, functions quite satisfactorily as a skimmer and scraper. Stainless steel would make a handsome skimmer, but we doubt if the life would be any longer than the life of the humble mild

steel plate, 0.15 to 0.20 per cent carbon. In addition the cost would be prohibitive.

We believe you would be much farther ahead by abandoning the use of a steel skimmer, and employing one made of graphite which would eliminate any iron pickup by the bronze.

Pouring Temperature of Alloy Varies With Type of Work

Can you give us any information on the best temperatures to pour the 88-10-2 and 88-8-4 alloys?

Pouring temperature for any copper-base alloy must vary with the type of work being poured. Obviously thin walled castings must be poured at a higher temperature than those with a thicker section. Consequently, we only can give you a range within which to pour those compositions. They are so similar that the pouring temperature is almost identical for both. However, the 88-8-4 alloy may require a trifle higher temperature; not more than 25 to 50 degrees Fahr. above that for the 88-10-2 alloy. That is explained by the fact that increase in zinc in the 88-8-4 makes the composition a little more sluggish. Furthermore, the increased zinc requires larger and higher risers to insure proper feeding.

Pouring range for the compositions is from 2050 to 2150 degrees Fahr. for normal work with an increase of perhaps 50 to 75 degrees under extreme conditions. It might be well to point out that pyrometers require careful maintenance and adjustment to insure accuracy. Do not place too much reliance on your pyrometer unless periodic checks are made. After you have gained experience in pouring those alloys with careful pyrometer control, you rapidly will acquire a knowledge of how the metals look after skimming at different temperatures. Such experience will enable you to recognize when the pyrometer is not registering correctly, and needs adjustment.

Proper pouring temperature of any composition is influenced by the type and number of gates. If the mold may be filled rapidly because of good gating, it may be possible to pour the mold at a little lower temperature and obtain satisfactory results. However, if the gates are such that filling is retarded, the metal must be more fluid or at a higher temperature to insure proper filling. Therefore, it may be seen that relationship between type of casting, pouring temperature, and method of gating is definite, and all should be studied carefully to obtain the best results.

Shrink in Small Casting Due To Insufficient Feeding

We are sending you two brass handle castings with which we are having trouble. The small casting shows a shrink at the heavy section which we believe is due to improper gating. We also have difficulty in polishing that casting as small pinholes develop after buffing. The large handle likewise shows small pinholes on the top surface after buffing, but are not visible before that operation. We also have trouble in that our wood bottom boards crack and warp after a few days' service. What material would be most suitable for such work?

Fracture of the castings submitted indicates that they are sound and clean, and properly poured at a satisfactory temperature. The skin surface is good, and the general appearance of the castings is reasonably satisfactory for the service intended. Shrink in the smaller casting is traceable directly to a lack of feeding. That shrinkage undoubtedly varies with the number of molds poured meaning that some molds show shrinky castings and others do not. However, because the latter do not exhibit surface shrinkage, it does not mean that they are free from shrinkage. It just indicates that under certain pouring temperature conditions the metal just fills the cavity and sets immediately, relegating the shrinkage to the interior. When the metal is poured hot, slower cooling occurs, and shrinkage appears in the riser.

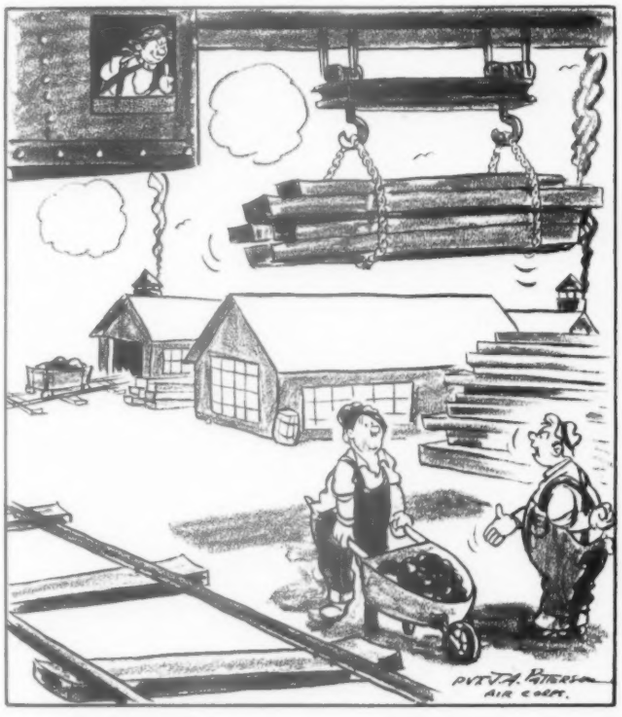
Cure for your trouble is to change the gating so that directional solidification takes place which simply means that the last metal to freeze is that in the riser—resulting in a properly fed, solid casting. In your case it is suggested that you provide a shrink ball feeder as close to the casting as possible.

As to the pinholes, we believe that sufficient skin was not removed in the polishing operation, and suggest that you give more attention to that operation, just polishing a little more to get down to solid metal.

With reference to your bottom boards warping and cracking after a few days' use, it appears that the wood is not properly seasoned, and you would do well to purchase a more suitable type. Metal or asbestos composition bottom boards would solve the problem, and even though the first cost is higher than wood, the longer life of those boards probably would make them cheaper in the long run. Also the metal or asbestos composition plates would remain straight eliminating the difficulty in trying to bed a warped board on a mold.

GANGWAY!

By Pvt. J. A. Patterson



"Take a fool's advice Hapgood—either shave off that mustache and comb yer hair right or quit walkin' under them cranes."

Heat Treatment for Bronze Castings

Can you give information on heat treating bronze castings to overcome leakage due to porosity? We have in mind 88-10-2 castings used in our centrifugal pump? We understand that such a process has been used, and would like to know the details.

Heat treatment of the 88-10-2 alloy for the purpose of reducing porosity, and consequently leakage, consists of an anneal which results in absorption of the secondary or delta constituent, and then slow cooling which provides a solid solution. The secondary or delta constituent forms during solidification under certain conditions, and occupies less space in the solid than in the liquid phase. Hence, small interstices or voids occur around the delta crystals, and if those voids join to form channels, seepage or leakage will take place. Reabsorption of the delta by heating, and preventing its reformation by slow cooling through conversion to a solid solution eliminates the voids and channels.

However, such an anneal will not be of any value if the trouble is due to blow holes or pin holes. It is suggested that you fracture some of the castings, and observe whether any voids, channels, or cavities are visible to the naked eye. If such is the case, annealing will not be of any help. Annealing to absorb the delta constituent is accomplished by heating the castings to 1000 to 1100 degrees Fahr., and holding at that temperature for two or three hours, or until all parts of the casting have reached that temperature. The castings then are allowed to cool slowly in the furnace until they can be handled without difficulty.

To Use a Sand Mold More Than Once

We have made large cast iron spider plates in dry sand molds from sweeps and solid patterns. We do not want to make the molds in loam, but we should like to have a mold that would stand up for several castings.

We believe that you should have no particular difficulty in getting several castings from a good dry sand mold, Millville gravel to which about 5 per cent pitch core compound has been added. The sand around the center core and to some extent around the outside shoulder will be torn to some extent each time and will require a little patching and local drying.

We assume that the mold will be cast with the hub down and that the cope or cover will be formed from a dry sand core in, say, 8 sections for convenience in handling. The most economical method of making the mold will depend to some extent on the available rigging and the number of castings on order, If the mold is to be made in the floor with a bottom plate and another plate on top, the mold readily and quickly may be bound together with heavy binders across the top.

Assuming that you have a bottom plate and flask, we suggest filling the drag with coke or cinders to the approximate contour of the bottom of the casting and within 6 inches of the bottom of the sweep. Cover the coke with a thickness of mud and lay a floor of bricks on edge and coming within about an inch of the bottom of the sweep. Then sweep a thickness of loam over the brick face to form the drag face of the mold. This will produce a solid, substantial base for a considerable number of castings. The bricks to be laid in rather open formation with fine cinders in the joints. Each time after the casting has been removed, minor repairs readily can be made by hand, while large patches—in case they appear—may be repaired by the sweep. The spindle seat remains permanently in position until the order is finished, the opening plugged with a handful of waste, or in any other convenient manner. The casting which will weigh approximately 6000 pounds can be poured through a single central sprue at the inside junction of the cover cores. This sprue will connect with four gates spaced 90 degrees apart in the top of the circular disk hub core.

Gases Are Absorbed During Melting

We are sending you a sample of a fractured casting, and you will note that most of the trouble appears on the cope side. Do you think that the difficulty is due to bad melting conditions?

In our opinion the discolorations in the cope side of the fractured specimen are the result of improper melting which permits the molten metal to absorb gases during that process. You will note that the drag side indicates a fairly clean fracture and sound structure, but as you approach the cope the discoloration appears, and increases in amount as you proceed. That is what is to be expected since the first metal entering the mold rests on the drag and solidifies first. As it cools it drives off and squeezes out the dissolved gases which finally are trapped in the last metal to freeze—that in the cope side of the casting.

We believe that when you find a casting that does not leak, the fracture will show a section practically free of discoloration. However, freedom from discoloration does not necessarily mean that the metal has not been gassed. It may mean that freezing or solidification has been such as to permit the escape of the dissolved gases. Cure for gassed metal of course, is proper melting condition. One definite way of assuring good melting is to melt as rapidly as possible. Rapid melting means high temperature in the furnace, and high temperatures only can be obtained by proper combustion. In melting do not permit any of the crucible charge to extend above the top of the pot, and be exposed to the furnace gases. Also after the molten metal has come up to temperature, do not let it remain in the furnace any longer than absolutely necessary since the longer the time, the greater the gas absorption.

Does Not Operate Cupola Properly

We have been operating a No. 4 cupola over a long period. It has a double lining of firebrick, and blast is supplied by a fan blower. During the heat the blast gate is closed almost as far as possible, and we get about 9 ounces pressure on our gage. Bed charge of coke is 1000 pounds by-product coke, and first iron charge weighs 1200 pounds. Succeeding charges are 80-pound coke splits with 800-pound iron charges and our heats average 15 charges. First iron appears in 7 minutes after the wind is on, and the blast is shut off as soon as the melter thinks all iron has been melted. Bottom usually is dropped in 1½ hours. We have been running about 2 heats a week, and the lining lasts only about 2 months which we think is rather short. Can you give us any suggestions?

Your cupola presumably is lined down to 42 inches which under good operating conditions should melt from 6 to 7 tons per hour against your present rate of 6.2 tons in 1½ hours based on one 1200-pound, and fourteen 800-pound charges. Cause of the slow melting rate may be due to shutting the blast gate too much, and we are curious to know why. It may be that your blower is much too large for the cupola. If that is the case we believe you would save money in the long run with a blower of the proper size.

However, it is our opinion that you are not operating the cupola properly, and the blast was reduced to overcome if possible some of the trouble. Evidently it did to some extent, but the root of the trouble still exists. Since we do not know all the factors involved, we can only give some suggestions which may help in solving your problem. You mention that your coke bed weighs 1000 pounds, but do not state the height of the tuyeres above the bottom. Assuming that your coke weighs 26 pounds per cubic foot, the bed will extend about

(*Concluded on page* 102)

How INCO Technical Service helps you conserve critical materials

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NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

(*Concluded from page* 100)

4 feet above the bottom since a 42-inch cupola has an area of 9.6 square feet.

Without knowledge of the height of the tuyeres we cannot tell definitely how far the bed extends above them, but our guess is that it is not enough, especially in view of your statement that the iron appears in 7 minutes after the wind is on. According to Reese that interval should be around but not over 15 minutes. Hence, more coke should be placed in the bed. As a starting point, it is suggested that you employ a coke bed which is 36 inches above the tops of the tuyeres—determined of course, after the bed has burned through properly. See how long it requires for the first iron, and increase or decrease the amount of coke until the time interval is say not less than 10 or more than 15 minutes.

We note that you employ a heavy first charge of iron and lighter succeeding charges, and that generally is frowned upon. You will obtain better results by using the same weight all the way through, and the choice will lie in your hands on whether 800 pounds, 1200 pounds, or some value between will be most satisfactory. In determining a suitable charge for the cupola, we are in accord with a suggestion made by Reese that it may be worth while to set the coke split first, and then base the iron on that figure rather than the other way around.

With that in mind we must have a yardstick to start with, and we think that most foundrymen will agree that a coke split from 4 to 5 inches thick will give a good, hot iron. Again assuming that coke weighs 26 pounds per cubic foot, a ring 42 inches in diameter and 4 inches high will require about 83 pounds of coke. Since that is an awkward amount to use, it is advisable to take 85 pounds as the figure to be used and that will give a coke split of a little more than 4 inches. You could go in the other direction, and reduce the coke weight to your present 80 pounds which would give a coke split of a little over 3¾ inches thick.

If you think your iron is hot enough now with your present ratio of 1 to 10, the suggested iron charge will be 850 or 800 pounds depending upon the coke split selected. However, if the iron is not hot enough you will have to make a change in the coke to iron ratio, and the preferable way would be to reduce the weight of iron rather than increase the weight of coke although it is possible that adjustments may have to be made in both iron and coke. In any event do not change more than one at a time, and give a reasonable time to note definitely the effect of such change.

With the coke and iron adjusted the next consideration is the blast. We believe that one of the first things you should do is to find out from the manufacturer of your fan just what its rating is—in other words the capacity in cubic feet per minute at various speeds. In calculating the amount of air required for melting constants ranging from 24,000 to 30,000 cubic feet per ton of iron are used, and of those our choice is 27,000 cubic feet since it agrees with some excess air to the theoretical value of 130.4 cubic feet of air at 14.7 pounds per square inch atmospheric pressure and 60 degress Fahr. to burn 1 pound of coke containing 86 per cent carbon. Hence, a cupola melting 6 tons per hour will need 2700 cubic feet of air per minute.

You do not mention in relation to your refractory problem whether you employ any flux such as limestone. Short heats often are run without any fluxing whatever, but we believe that it is worthwhile to place at least one charge of flux, and preferably right on top of the bed coke. Amount of flux to use ranges from 2 to 4 per cent of the weight of the iron charge.

Arrange Tuyeres on A Small Cupola

We are plannig to convert a 30-inch diameter steel shell into a cupola. Patterns are ready for the base, legs, charging door, front and back spouts, but we are undecided about the tuyeres. We have a positive pressure blower with a capacity of 600 cubic feet per minute at 455 revolutions. We shall have three tuyeres, one at each side and one in the rear over the slag hole. Without a windbox we should like to know what shape and size of tuyere is best. What is the proper height for the tuyeres above the sand bottom, also the height of the charging door. What size blast pipe is required. We want to have peep holes in the tuyeres, also safety plugs.

A 30-inch diameter shell with a single lining 4½-inch fire brick set on end will provide an inside diameter of 21 inches and will melt approximately 1 ton per hour with a consumption of 30,000 cubic feet of air. Your blower with a present capacity of 36,000 cubic feet per hour can be slowed down either in the number of revolutions or with a gate in the blast pipe. Size, shape and number of tuyeres may be varied to a considerable extent without affecting the operation of the cupola. For example you might install a continuous tuyere, a single opening 3 inches between a lower and an upper plate and with a few upright members to support the upper plate. Connection through the shell could be made with short pieces of 4-inch pipe.

An alternative method would be to install three tuyeres rectangular in cross section, 3 inches high and flared horizontally at the mouth to 9 inches. Many small cupolas operate with two or three plain round tuyeres 4 inches in diameter. The main factor is to provide openings through which the proper volume of air can enter at comparatively low pressure, in this instance approximately 6 ounces. The peep hole and the safety plug represent refinements rather than actual necessities. For ordinary operation the tuyeres are set about 10 inches above the sand bottom. Height of the charging door depends on many factors including method of charging, length of heat and layout of existing building and may range from 6 to 10 feet above the sand bed. For a proper understanding of all features we suggest a study of *Melting Iron in the Cupola* by J. E. Hurst

Chillers Should Be Clean and Dry

We are making tractor rollers in molds made up of cores and sectional chills, and casting every other day. The molds pop up when they are filled with iron. Should the chills be heated. The cupola mixture contains 25 per cent steel scrap from the boiler shop, 25 per cent scrap motor blocks, 25 per cent machinery scrap and 25 per cent pig iron of the following analysis: Silicon 2.08 per cent, sulphur 0.30 per cent, phosphorus 0.88 per cent and manganese 0.53 per cent. Is this a suitable composition?

Since presumably the center of the casting is bored for the pin, your present iron which probably chills to a depth of ¼-inch is about as hard as you can make it. All chilled castings are subject to the same compromise. The sulphur content in your pig iron 0.30 per cent is so extraordinary that we are wondering if it is not a typographical error and should read 0.03 per cent. Where chills remain in green sand molds for part of two days a certain amount of condensed moisture may cause the molten metal to pop, but that condition does not exist where the remainder of the mold is made up as in the present instance, of dry sand cores. Before the chills are used they should be cleaned thoroughly and then coated with any one of a wide variety of materials. In some cases a light coating of oil is sufficient. In others it is advisable to add plumbago to the oil. All foundry supply houses sell proprietary washes for chills. A coating which you can prepare yourself is made up of 1 part shellac and 9 parts alcohol with a handful of plumbago per quart of mixture. If it was possible to pour a chilled mold slowly, a slight kick or pop would not be noticed. However, chilled molds must be poured rapidly to prevent the formation of waves, worms, or wrinkles on the face of the casting.

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men of industry

AUGUSTUS W. CALDER JR., assistant manager in charge of foundry operations, and assistant treasurer, New England Butt Co., Providence, R. I., was elected president, New England Foundrymen's Association at its recent annual meeting. Mr. Calder was born in Providence and was educated in the public schools of that city. He attended Brown University from which he was graduated in 1928 with a degree of bachelor of philosophy having specialized in engineering. He became connected with the New England Butt Co. upon graduation and after several years as a trainee in foundry, machine shop and management work, was appointed assistant manager in charge of foundry operations in 1935. He has continued in that work, and in 1941 was elected treasurer of the company. Mr. Calder is particularly proud of the fact that the New England Butt company's foundry completed 100 years of operation in 1942. In addition to his interest in the activities of the New England Foundrymen's Association, he also is a member of the Providence section, American Society of Mechanical Engineers and the Providence Engineering Society.

♦ ♦ ♦

Bruno Sachs has become production manager, Dillon Corp., Irvington, N. J. Mr. Sachs who is a native of Vienna, Austria, was graduated from the Technical University of Vienna as a mechanical and metallurgical engineer, specializing in hot working of nonferrous metals. From 1925 to 1939 when he immigrated to the United States, Mr. Sachs held positions in Austria and as a foreign specialist with the Russian government. Upon arriving in the United States, he became technical director Johnson Bronze Co., New Castle, Pa., resigning that position to join the Dillon Corp.

♦ ♦ ♦

Capt. Nelson W. Pickering, U.S.N.R., has resigned as president, Farrel-Birmingham Co., Inc., Ansonia, Conn., and Buffalo, and reported for active duty in the United States Navy. Capt. Pickering has been assigned to duty as Commander of U. S. Navy Section Base at New London, Conn., and Commander of local defense forces.

♦ ♦ ♦

Nelson Grant recently has become connected with the Doehler Die Casting Co., Batavia, N. Y., in charge of the core room. Mr. Nelson started his foundry career as a boy of 12, serving an apprenticeship in a malleable foundry at Port Huron, Mich. after school, holidays and during vacations. Later he went to Lansing, Mich. where he worked for the Seager Engine Works, a year after becoming coremaker for the Flanders Mfg. Co., Pontiac, Mich. In 1913 Mr. Grant became a coremaker and assembler for the Holmes Foundry Co., Port Huron, Mich. Five years later he joined the Great Lakes Engineering Works, Detroit, taking charge of the core room there until 1925 when he became connected with a gray iron foundry in Saginaw, Mich. In 1927 he returned to the Holmes company in charge of the core room. He next became connected with the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., remaining there until recently.

♦ ♦ ♦

Jonas R. Moore, a graduate of the University of Nevada, has been appointed to the research staff, Battelle Memorial Institute, Columbus, O.

♦ ♦ ♦

Howard Coonley, New York, has been appointed director of a new Conservation Division, War Production Board. Mr. Coonley, formerly was board chairman, Walworth Co., New York.

♦ ♦ ♦

Charles F. Christopher recently has resigned as special engineer with the Steel Co. of Canada, Hamilton, Ont., to take charge of all steel melting operations of the Continental Roll & Steel Foundry Co. Mr. Christopher, who was graduated from the University of Pitts-

(*Concluded on page* 106)

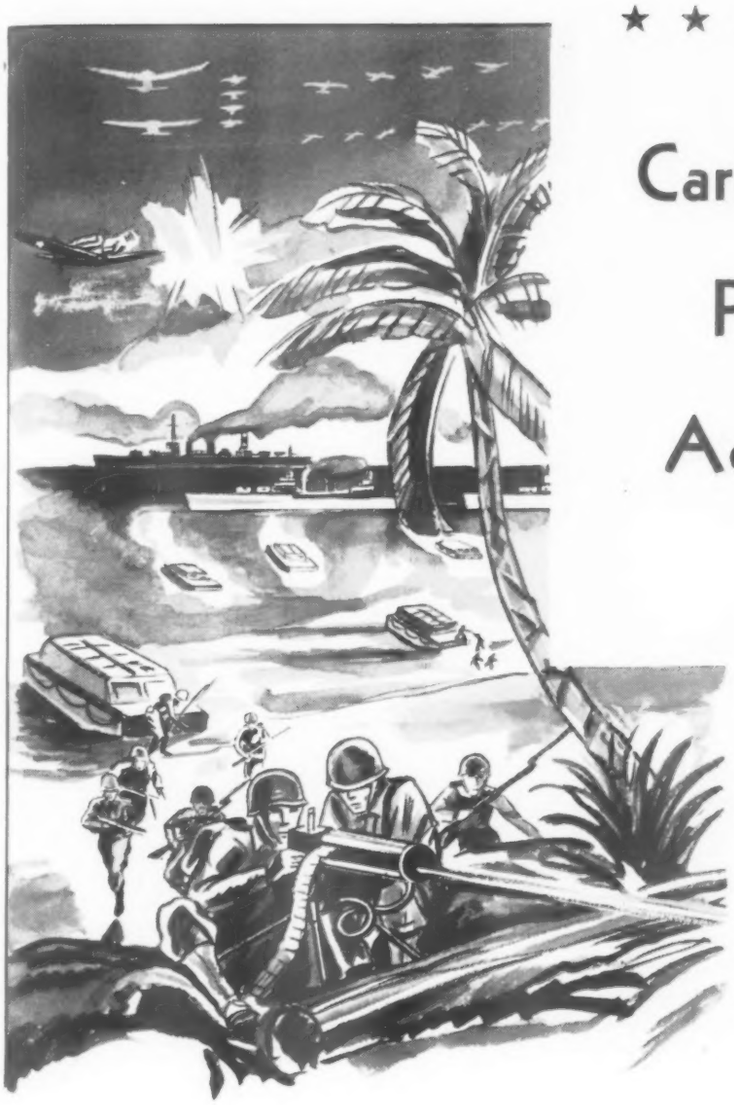
Capt. N. W. Pickering

Bruno Sachs

Nelson Grant

A. W. Calder Jr.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



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(*Concluded from page* 104)

burgh, in 1923, began his business career with Jones & Laughlin Steel Corp. as inspector. Later he was associated with the United States Bureau of Mines, Carnegie Institute of Technology and Metallurgical Advisory Board. During that time, he worked with Dr. C. H. Herty Jr., in open hearth research and development problems involving both acid and basic practices. From Pittsburgh, Mr. Christopher went to Latrobe, Pa., where he was open hearth superintendent and chief metallurgist, American Locomotive Co. serving from 1934 to 1940 when he joined the Steel Co. of Canada. With Continental in 1943, his time will be divided between the plants at Coraopolis, Pa., Wheeling, W. Va., and East Chicago, Ind.

♦ ♦ ♦

L. C. Rathsburg, for the past 20 years in charge of the Chicago office, Lakeside Malleable Casting Co., Racine, Wis., has been elected vice president. Mr. Rathsburg will continue to be located in Chicago.

♦ ♦ ♦

Harvey T. Hill, Chicago regional industrial salvage director, Conservation Division, WPB, resigned Feb. 1, to return to his former position as executive director, Chicago Association of Credit Men.

♦ ♦ ♦

Lee Kahn, identified for many years in the purchase, production and distribution fields of nonferrous smelting and refining industries in the Chicago area, has become associated with R. Lavin & Sons, Chicago.

♦ ♦ ♦

DuRay Smith, general manager, Union Spring & Mfg. Co., New Kensington, Pa., has been appointed vice president in charge of operations of the electric steel casting department and the entire spring plant.

♦ ♦ ♦

S. A. Mondell recently has joined the Sterling Alloys Inc., Woburn, Mass., as melter foreman. For the past 6 years, Mr. Mondell was connected with the National Tube Co., Ellwood Works, where he was engaged in experimental hot mill tool development and related melting and heat treatment.

♦ ♦ ♦

Paul W. Johnson, acting superintendent since June 1941, Farmall Works, International Harvester Co., Rock Island, Ill., has been appointed superintendent. After graduating from Purdue University, Mr. Johnson spent several years in

the agricultural implement industry in the Tri-City area, joining International Harvester in 1933 as a tool designer. He was appointed second assistant superintendent of the Farmall works in 1940 and assistant superintendent in 1941. **W. W. Wilson** succeeds Mr. Johnson as assistant superintendent.

♦ ♦ ♦

Curtis H. Barker Jr., materials handling expert, General Electric Co., Bridgeport, Conn., has been granted a leave of absence by the company to join the Navy Department as technical consultant in its Supply Corps.

♦ ♦ ♦

George H. Stein, general foundry superintendent, Acme Pattern & Tool Co., Dayton, O., has been made vice president and assistant general manager, in charge of all Acme operations. **A. J. Fischer** succeeds Mr. Stein as general foundry superintendent.

♦ ♦ ♦

Paul Dyer Merica, vice president, International Nickel Co., New York, and **Essington Lewis,** director general of aircraft production and director general of munition for the Commonwealth of Australia recently have been elected to honorary membership in the American Institute of Mining and Metallurgical Engineers.

♦ ♦ ♦

John M. Frank, president, Ilg Electric Ventilating Co., Chicago, was elected president of the National Association of Fan Manufacturers at its annual meeting held in Buffalo on Jan. 14.

♦ ♦ ♦

S. H. Hobson, formerly executive vice president, has been elected president and a director, George D. Roper Corp., Rockford, Ill., succeding the late Mabon P. Roper. All other officers have been re-elected, including **W. E. Derwent, E. Carl Sorby** and **J. P. Curtin** as vice presidents, and **Floyd K. Lawson,** secretary-treasurer. Manufacturing operations will be supervised by **Otto Olson,** works manager.

♦ ♦ ♦

Orin C. Rogers has been appointed chief in charge of the fifth region of the Industrial Salvage Branch, WPB., Cleveland. Mr. Rogers succeeds **J. C. Deibel** who has been assigned to Washington.

♦ ♦ ♦

Chester Malysiak has been appointed to the research staff, Battelle Memorial Institute, Columbus, O., where he will assist in conducting research in the division of nonferrous metallurgy. Mr. Malysiak is a chemical engineering graduate of Purdue University.

♦ ♦ ♦

Hoy O. McIntire has joined the staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in metallurgical research and development. Mr. McIntire, is a graduate of Manchester College, North Manchester, Ind., and has had post-graduate work at Purdue University.

♦ ♦ ♦

James R. Hewitt, for the past year assistant to the vice president, American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill., has been appointed vice president. Mr. Hewitt became affiliated with the company in 1935.

♦ ♦ ♦

Commander R. E. W. Harrison, U.S.N., who returned in July, 1942 to the Chambersburg Engineering Co., Chambersburg, Pa., in temporary inactive duty status, was recalled to active duty Feb. 1. Commander Harrison will be in the office of the Under-Secretary of the Navy, serving directly under Admiral H. G. Bowen.

♦ ♦ ♦

Louis Kahn, for many years secretary-treasurer and executive head of Albert Kahn Associated Architects and Engineers Inc., Detroit, has been elected president to succeed Albert Kahn who died recently. Other officers elected are: **Sheldon Marston, George H. Miehls** and **Robert E. Linton,** vice presidents; **George K. Scrymgeour,** secretary and **Saul Saulson,** treasurer.

♦ ♦ ♦

Andrey A. Potter, dean of engineering, Purdue University, and chairman of the National Advisory Committee on Engineering and War Training, has been named recipient of the Washington Award for 1943 for "distinguished leadership in engineering education and research, and patriotic service in mobilizing technical knowledge for victory in war and peace."

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BY A. H. ALLEN
Detroit Editor,
The Foundry

Foundrymen around the fireside tell their troubles, including Chiseling Chippers and Willie Wontworks. . . Gray Iron Industry Produced 14,600,000 tons of castings in 1942. . . Gotta have glamor today

FOUNDRYMEN'S FIRESIDE CHAT: There are few enough moments to pause after the day's rush and to examine the foundry production picture both retrospectively and introspectively, but when the opportunity does present itself, there appears one significant conclusion—that despite almost prohibitive obstacles, castings plants are turning out one hell of a pile of stuff.

Among assorted obstacles with which managerial talent is having to contend daily, not the least troublesome is labor. Throughout most foundries, and in some more critical than in others, a labor element is proving at times altogether obnoxious. To these recalcitrants and trouble-makers, work is of only minor importance; the principal activity is stirring up trouble with management, arguing over wages, demonstrating against supervision and in general just dogging the job.

Raise Trouble and Lose Job

Typical is an incident which occurred in the Detroit area in one of the larger foundries recently. A negro chipper, 6 foot 2 inches in height and weighing about 250 pounds, was continually arguing with his foreman about working conditions and wages. One day he became particularly incensed, picked up a chisel and took off after the foreman who beat a hasty retreat. The plant superintendent summoned the attacker to his office after the incident, which ended without bloodshed fortunately, and after some delay the negro came in escorted by three union stewards. The superintendent said he had called only the one man, but the quartet replied that if there was anything to be said they were all going to hear it.

The superintendent remained adamant and refused to talk to the group. Finally, the three escorts left and the superintendent explained that he was not in the habit of sanctioning chisel attacks on his foremen; also that he had looked up the chipper's pay record which showed that his average rate for several weeks had been on the order of $1.80 an hour or a weekly total of $85-90. In the face of such a bonanza for the chipper, he could see no reason for complaining over wages, so the worker could consider himself discharged.

Multiply such incidents by the hundreds and you have an inkling of some of the problems which supervision must spend fully 50 per cent of its time thrashing out, leaving only half of the working time to concentrate on production.

Little incident like these regularly resolve into strikes which disrupt operations for a few hours or even a few days. Then follows a lengthy series of hearings by conciliators which take more time away from production. Then possibly an agreement will be signed with the union which will look like the end of trouble, but within a day or two the disturbances will start again. A crew will march into management and say that they are quitting on the spot if they are not given thus and so in respect to wages. Management will say that wages have been frozen at certain levels by the government and any deviation has to be processed through a series of special reports to the labor board and approval granted by the board. To this the men usually reply that management is lying and they are going to strike anyway.

Not His Brother's Keeper

During one of these strikes in a foundry, a foreman walked over to one of the strikers who was sitting around doing nothing and said substantially as follows: "It gets me how you fellows can pull this stuff when you read and hear about our soldiers dying on battlefronts all over the world and when you know of the continual demand for more production. If you had someone you knew personally out on the firing line I'll bet you would get back to work in a hurry."

"Nuts," replied the idle striker, "I've got a brother on Guadalcanal right now."

Strong men in the ranks of management are slowly breaking under the strain. Their numbers have been spread out thin as it is, and the pressure from two sides—production and labor—often becomes unbearable. Yet when you ask one of these men, "Well, why not close up the shop until you can get a working force which will do a job and stick to it?", the answer comes right back, "We can't do that. We have orders to fill, and do you know that in spite of all our trouble, the shop turned out 4000 tons of castings last month, which is triple what we ever did before with substantially the same equipment."

Foundry Is Huge Industry

The gray iron foundry industry includes some 2856 plants, large and small, captive and independent, throughout the United States. Last year, that heterogeneous industry turned out an estimated 14,600,000 tons of castings or nearly a fifth of the total tonnage of steel ingots produced by the steel industry. In spite of this tremendous tonnage, which had an estimated value of $1,600,000,000, the gray iron foundry industry is faced with the fact that as an engineering material, gray iron probably is not appreciated to the extent that modern developments would seem to justify. Most textbooks have not kept up to date with progress. Engineers and designers have no accurate knowledge of what gray iron can provide. Even among the host of individuals who represent industry on the well-staffed WPB, OPA and other government war agencies, including Army Ordnance, you can count on the fingers of one hand the individuals who might be considered to be representing the gray iron foundry industry, and none of these is in a key position. Here is a great and basic industry, with production facilities scattered throughout the country, which stands to see its postwar markets falling to competitive materials, as it has seen its war possibilities too often ignored. There are those who think such things should not be, and are proposing to take steps to correct the situation. Some early results of these proposals can be expected.

It is reasoned, and with complete logic, that one of the first steps the gray iron castings producers could take would be

(*Concluded on page* 110)

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ELLWOOD CITY
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(*Concluded from page* 108)

to work out standard specifications, with related properties, much as the S.A.E. has done in years past with carbon and alloy steels. Gray irons range all the way from sashweight material up to alloyed special-purpose irons. There is no reason why all this variety of types could not be condensed and standardized, reduced to tabulated standards in manuals, and thus provide engineers and designers with up-to-the-minute concrete data telling what they can expect from certain designated types of iron. Naturally, such a compilation would require considerable work, but there is no doubt that it would be well worth the labor involved.

Perhaps the whole thing is tied into the subject of glamor. Everything to be successful today has to be glamorous. We are fighting a glamorous war. Our airplanes are glamorous; our tanks are glamorous our battleships are glamorous. Our light metals and plastics are glamorous.

Soon blast furnaces will be glamorous, if the opening ceremonies attendant upon the lighting Henry J. Kaiser's Fontana, Calif., furnace are any indication. The story is told that when the arrangers of the ceremonies discovered there was nothing particularly spectacular about lighting a blast furnace, they decided to create a spectacle, so they arranged to shovel a couple hundred pounds of magnesium powder into the new furnace, and the affair went off with a bang!

If, in truth, it takes magnesium powder to keep step in the materials competition, then maybe the sound policy is to recognize this fact and sprinkle it on liberally, but it would be a little dangerous to attempt to glamorize the gray iron foundry industry with magnesium. That's just borrowing trouble.

A.S.T.M. Committees Will Meet

During Committee Week which is held in conjunction with the spring meeting of the American Society for Testing Materials numerous technical committees of the association will convene to discuss matters relating to their activities. The spring meeting will be held at Hotel Statler in Buffalo during the week beginning March 1. Committee meetings of interest to the foundry field include those of subcommittees of Committee A-3 on cast iron; Committee A-6 on magnetic properties; Committee A-10 on iron-chromium, iron-chromium-nickel and related alloys; Committee B-3 on corrosion of nonferrous metals and alloys, and Committee B-7 on light metals and alloys, cast and wrought.

Nonferrous Society Enlarges Service

In an effort to provide an organization to handle the many problems occasioned by production demands and government limitation orders, the Nonferrous Founders' Society, which was organized several months ago by foundrymen in the Chicago area, soon will launch a nation-wide drive for membership. Plans for the future expansion of that organization to serve brass and bronze foundries throughout the nation were determined at a meeting of foundrymen from the middle west at Chicago on Feb. 1.

At that meeting, a program of worthwhile service to the nonferrous foundry industry was discussed in detail. The organization already has an office in Washington in Room 914, National Press Building, which has been aiding a number of foundries.

Chester K. Faunt, Christensen & Olsen Foundry Co., Chicago, is chairman of the executive committee of the society and R. M. McClure, 111 West Washington Street, Chicago, is secretary-treasurer.

Lists Organizations Awarded "E"

Foundries and foundry equipment manufacturers were included in a list of industrial organizations which are to be honored for excellent production records by the award of the Army-Navy "E" pennant. The list was recently released by Under-Secretary of War, Robert P. Patterson and Under-Secretary of the Navy, James V. Forrestal. The foundries and equipment manufacturers are:

Acme Pattern & Tool Co. Inc., Dayton, O.; Adams & Westlake Co., Elkhart, Ind.; Anaconda Copper Mining Co., Anaconda, Mont. Babcock & Wilcox Co., Refractories Division, Augusta, Ga.; Cadillac Motor Car Division, General Motors Corp., Detroit; Chicago Pneumatic Tool Co., Cleveland; Clark Equipment Co., Buchanan, Mich.; Continental Roll & Steel Foundry, Coraopolis, Pa.; Crane Co., Chicago; Crouse-Hinds Corp., Syracuse, N. Y.; Delta Mfg. Co., Milwaukee; Fairbanks, Morse & Co., Beloit, Wis., Freeport, Ill., and Three Rivers, Mich.; Farrel-Cheek Co., Sandusky, O.; Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Hercules Powder Co., Kenvil and Parlin, N. J.; Kelsey-Hayes Wheel Co., Detroit and Jackson, Mich.; Lima Locomotive Works, Shovel and Crane Division, Lima, O.; Lindberg Engineering Co., Chicago; Mathews Conveyer Co., Ellwood City, Pa.; McCallum Hatch Bronze Co. Inc., Buffalo; Monroe Steel Castings Co., Monroe, Mich.; Morrison Bros. Co., Dubuque, Iowa, National Supply Co., Toledo, O.; Oregon Brass Works, Portland, Oreg.; Otis Elevator Corp., Buffalo; Raybestos-Manhattan Inc., General Asbestos & Rubber Division, North Charleston, S. C.; Stow Mfg. Co., Binghamton, N. Y.; Unitcast Corp., Steel Casting Division, Toledo, O.; Walworth Co. Inc., Kewanee, Ill.

Cleveland Quarries Co., Cleveland, recently has appointed Miller & Zehrung Chemical Co., 1301 Northwest 12th Avenue, Portland, Ore., as representative in the state of Oregon for the sale of silica firestone. Industrial & Foundry Equipment Co., 1917 Broad street, Chattanooga, Tenn., also has been appointed representative for the state of Tennessee.

Army and Company Officials Tour Plant

Army officials and executives of the Caterpillar Tractor Co. and representatives of its labor-management committee recently inspected the organization's plant including the foundry. The accompanying illustration shows, left to right: L. B. Neumiller, president of the Caterpillar company; H. S. Eberhard, vice president; M. J. Gregory, factory manager, foundry division; Brig. Gen. Raymond F. Fowler, chief of the supply division, United States Engineers; and Gen. Charles Keller, district engineer of the Chicago District

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Dear Mac:

Last nicht I was gabbin' wi' th' super o' a big motor car foundry, awfu' busy th' nu wi' castings for ordnance orders. The auld mon ken his core oils; and when he said he always figured his oil expense on cost-per-ton-of-sand mixed, I wa' vurra, vurra pleased indeed because that's been my ain idea.

Because of the expansion and contraction of oil due to atmospheric changes, the only possible method of securing uniform quality is to manufacture core oil by weight, so it obviously should be used on a weight basis. Thus, regardless of temperature, more uniform tensile strength and surface hardness and more uniform drying is obtained.

Certified Core Oil means maximum results at the more economical cost: in the core-making itself, in the cleaning department and in smoother castings. Why not, with no obligation whatever, send us a 4 oz. sample of the core oil you are using; stating whatever troubles you may be experiencing. Also tell us whether or not any cereal binder or other binder is used; and the type of sand employed. We will then analyze your oil and make our recommendation.

Here is the answer to your question: "What is the effect of changes in temperature on core oils or core mixes?"

Answer: The average core oil will expand or contract approximately 3% of its volume with a temperature change of 100°. If oil is used by measure and its temperature in summer is 80° F. and in winter 20° F., the container holds 1.8% more oil in winter. This results in cores made in the winter time not being properly baked, and more smoke and gas when the metal is being poured, just when your windows and doors are closed, unless the heat or baking time have been adjusted. Also, if the cores have sufficient strength with 1.8% less oil in the summer, then the extra oil used in the winter is simply wasted.

The remedy is: Don't use your core oil by measure - weigh it. You will save core oil and get much more uniform cores.

I will be glad to explain this problem more fully upon request.

Weeshin' you unco joy,

Scotty Waugh

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the adventures of Bill

BY PAT DWYER
Drawings By RICHEY

I SUPPOSE it is too late now," Bill said, the other night, "but I wish I had started a couple of years ago to compile a scrap book of clippings from newspapers and other publications. Nothing like the good old printed word when you get into an argument with a lad who lacks some of the buttons, but who has the audacity to doubt your word and to insinuate that you are pulling the long bow. If you can produce a clipping in fairly readable condition covering the point at issue, and furthermore if the poor dope is able to read it, you have him yelling for help like the cat in the tar barrel."

"You remind me," I said "of a certain Hollywood character. If any person happened to ask him for the time, he would start in with a general dissertation on how man first discovered and then gradually developed methods of measuring time, first in a general way by the movements of the heavenly bodies, and then more in detail, by various mechanical contrivances. Each of these devices merited more or less detailed reference. Then he would launch into a description of modern watch making technique, with digressions touching on machining and assembling operations, mining and processing of precious stones for the spindle bearings, and wind up with a few hundred well chosen words on physical and metallurgical characteristics of the watch cases."

"Well, so what?"

"I'll tell you so what. You start off with a more or less cryptic reference to a scrap book and wind up with a cat yowling for help from the bottom of a tar barrel. If I thought there was the slightest chance of your taking a bit of homely advice, I might tell you that the best way of settling an argument is to refrain from starting an argument. Just to prevent you from starting an argument on that point, would you mind telling me what kind of material you had in mind for filling this pet scrap book."

"Not at all, me boy. Not at all. Willing Willie, they used to call me when I was a boy—" "Did you say Willing Willie, or Wiggling Willie?"

"You heard me the first time. Plain, simple and straightforward in all my statements and consequently strongly opposed to and irritated by wiggling tactics on the part of others either in the written or spoken word. When we have mopped up after this present job, washed our hands, put on our coats and settled back into peace time routine, at least 147 writers will publish books dealing with the war. They will crib all kind of stuff from old newspapers, fashion it into a kind of hash and present it as the first hand impression of an astute observer actually on the spot when each and every item of news was in the making. There, my nosey friend is the whole kettle of fish in a nut shell, my reason for wishing I had compiled a scrap book. Do I make myself clear?"

"Spoken like a true man and a patriot. Confidence begets confidence. The answer is NO."

"Oh, well," said Bill, " 'Twas ever thus, the typical reaction of the proletariat mentally deficient to words of wisdom. This book of mine—had I started it in time—would have been a wow."

"That is what you think. If you ask my opinion, which of course you won't, it would be a washout. Another case of love's labor lost. People with sons and other relatives in the service will be so sick of the whole thing that by the time it is over, they will never want to hear of war any more. You had better stick to the foundry where you know your way around and leave the writing of books to those who do not know of any better way of making a living."

Time to change the time again

"Pon my word," I noted with approval that he was becoming slightly impatient "Pon my word you would tax the patience of old what's his name, the old bird with the boils and one thing or another—used to scratch himself with the ragged edge of a broken pot—Job, that's the lad — well, anyway what I was going to say is that I said nothing about writing a book. What I had in mind was a collection of slips of the tongue and pen made by some of the men clothed with a little brief authority and suffering from delusions of grandeur, who are guiding the ship of state and keeping her on an even keel in these perilous and crucial times.

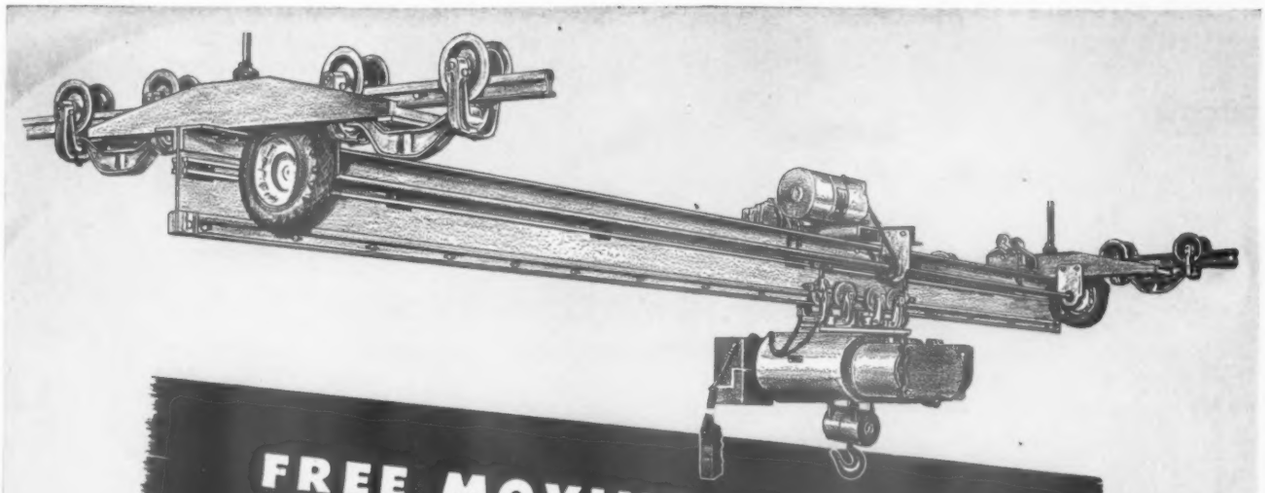
"One of these random newspaper stories floating out of Washington recently stated that the chief of an important bureau called up the chief of a second equally important bureau to beg for a little information. The call was relayed by easy stages through the third, second and first assistants and finally reached the confidential secretary who informed the caller that if he kindly would hold the wire a moment the chief himself would be at his service. The first man had hardly finished his first cigaret when the second chief graciously inclined his ear and assured his colleague that he was now prepared and in position to give him his full and undivided attention.

"This is merely a somewhat free translation. What he actually said was 'O.K. Jim. Shoot', Time, as every person knows is one of the most carefully and rigorously rationed elements in the administration of a government bureau.

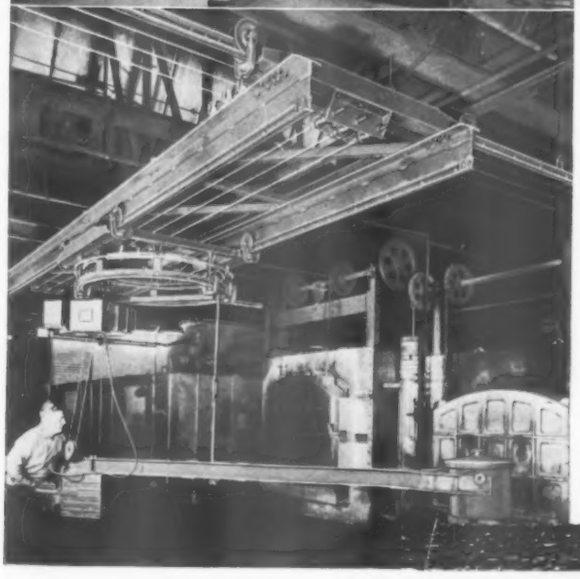
"The first man whom we shall call *A* for the sake of clarity and because—as you probably suspected—that is not his real name, said he was compiling statistics on the mineral resources of the country and the location of all mines, active and inactive. Up to the present, despite the most painstaking work on the part of a large corps of assistant diggeruppers, he had been unable to find any figures or data of any kind on the brass mines. Could his honorable friend tell him where or how to go about collecting this information?

"Fortunately, the second man whom we may call *B* for no particular reason had a sufficient infusion of the grace

(*Continued on page* 114)



FREE MOVING CRANES AID WAR WORK



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American MonoRail Cranes have proved to be invaluable in hundreds of installations. With the structural design greatly simplified, dead weight of the crane bridge is kept at the lowest point consistent with strength. This provides maximum live load capacity and requires less effort to move. Elimination of friction at all points by the scientific use of proper bearings make American MonoRail cranes the easiest of all to handle.

Let an American MonoRail Engineer consult with you.

Standard Crane Parts assembled into special unit at low cost to meet unusual production requirements.

THE AMERICAN MONORAIL CO.
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(*Continued from page* 112)

of God and a sense of humor to supply the information without collapsing. 'Hey,' he said, 'Are you kidding? They don't get brass in a mine. They extract it from sea water!'

"Foundrymen who read that story when it first appeared, or heard it afterward in any of the thousands of places where men discuss the burning questions of the day and other more important personal items, were divided into two groups. The first group was mildly amused at what they considered the tongue in the cheek production of a somewhat bored and whimsical reporter. The second group, taking the story literally, felt the same degree of irritation, as any person skilled in a certain art or subject, feels in the presence of complacent and ignorant comment.

"Manufacture of nonferrous castings is one of the oldest if not actually the oldest of the industrial arts practiced by man. Archeologists digging into the Far East cradle of the human race when the digging was done by pick and shovel, and not with explosive bombs, have discovered castings that were made as far back as 300 years before the Christian Era. The history of brass and bronze and their component alloys copper, tin and zinc is a facinating subject even if most of our knowledge is based on tradition and legend. Sacred and profane history have many references to remarkable castings, but are silent or extremely vague on the methods of making the molds or melting and pouring the metal. Foundry procedure for thousands of years was conducted by the well known rule of thumb, with every man making castings to suit himself. If the customer did not like the product he was told that was all there was. There was not any more. Them was the good old days.

"Every person is familiar with the story of the Golden Calf, sometimes flippantly referred to as the earliest example of the adoption by some people of the gold standard. Does any person know definitely whether this interesting casting weighed a pound or 1000 pounds? Was it the size of a watch charm, a paper weight or the size of a healthy young bull calf at the age of one month, six months or a year?

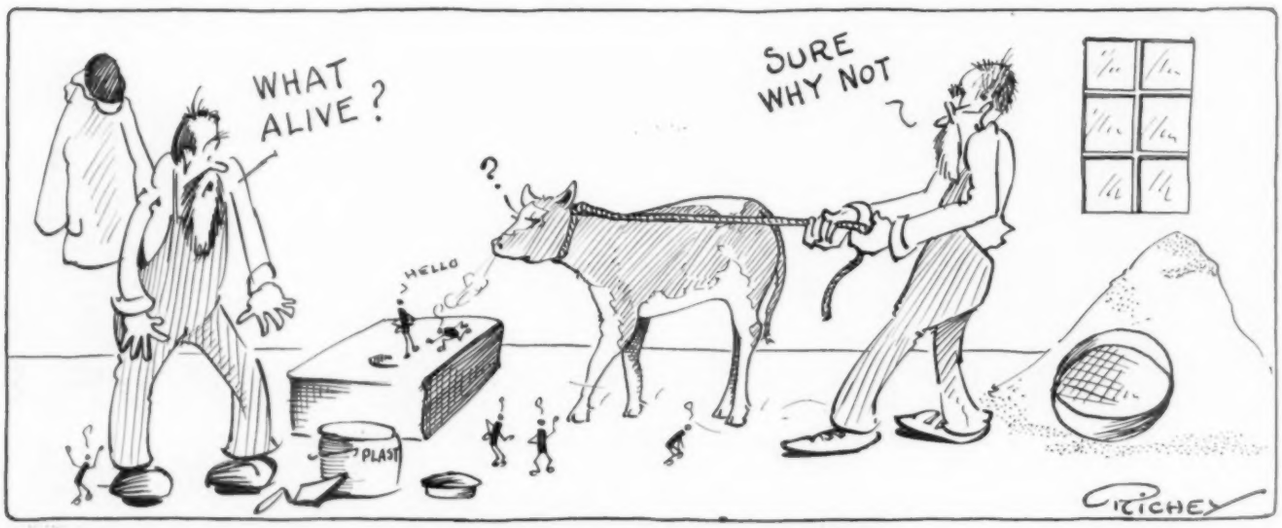
"So far as I remember the lad who tells the story says nothing about a pattern, a mold, a pot, a furnace, or fuel. These things cannot be picked up in a desert country and it is rather difficult to visualize their manufacture by a shiftless gang rambling aimlessly for 40 years in a strip of land about the size of Rhode Island. It is not quite so difficult to visualize the unlucky foundryman elected by popular vote to make the casting, with no material or equipment except a pile of 5 and 10 cent jewelry donated in a scrap drive by the women. Before he finished that job, I bet he had not what my old uncle Malachi calls a 'stim iv hair on his owld poll' and his nails were bitten down to the roots. However, after the casting was made it was not thrown out of the machine shop because it would not stand up to air or water pressure. That is a strictly modern hazard.

"I had a letter recently from a brass foundryman up against this kind of trouble with a casting 12 x 30 inches, a rectangular plate with a hub 5 inches diameter and 12 inches deep in the center of one side. He has poured the metal at various temperatures. He has tried molding the casting with the hub in the drag and also with the hub in the cope. He has gated the casting from the bottom, from the side and from both ends. The casting apparently is satisfactory when shaken out and cleaned, but defects in the form of gas holes appear when the hub is machined. In some instances the castings machine up clean and withstand a water pressure test of 55 pounds per square inch, but leak when subjected to air pressure of 15 pounds per square inch. Some castings scab on the flat face. He makes many other types of castings without any trouble.

"Apparently his metal composition and melting practice are satisfactory in a general way. Otherwise castings poured from the same pot or from the same heat would be defective. However, a temperature of 2300 degrees Fahr. for steam metal is unnecessarily high. A pouring temperature of 2000 to 2100 degrees Fahr. is high enough for this casting. The trouble in this particular instance is due to lack of proper venting in the mold and possibly in the core. On account of the shape, a flat plate with a deep hub in the center, the mold must be vented to a greater extent than is considered necessary with the usual run of castings. The mold may be made with the hub either in the cope or in the drag, but in either case the drag must be vented liberally.

"In many instances the molder vents the drag with a wire, and then nullifies his effort by clamping a bottom board so tightly to the drag that the steam and gas cannot escape. This steam and gas causes the metal to bubble, and the bubbles are trapped to form a honeycomb structure in the casting. Where the bubbling is not sufficiently violent to form gas pockets, it is still strong enough to produce a tremor in the metal and form microscopic voids which permit air under pressure to seep through in the test. The admission that the casting scabs on the face is direct evidence that the metal boils on the face

(*Concluded on page* 186)



Unfortunately we have no evidence to indicate whether the old boys bedded the pattern in or rolled it over

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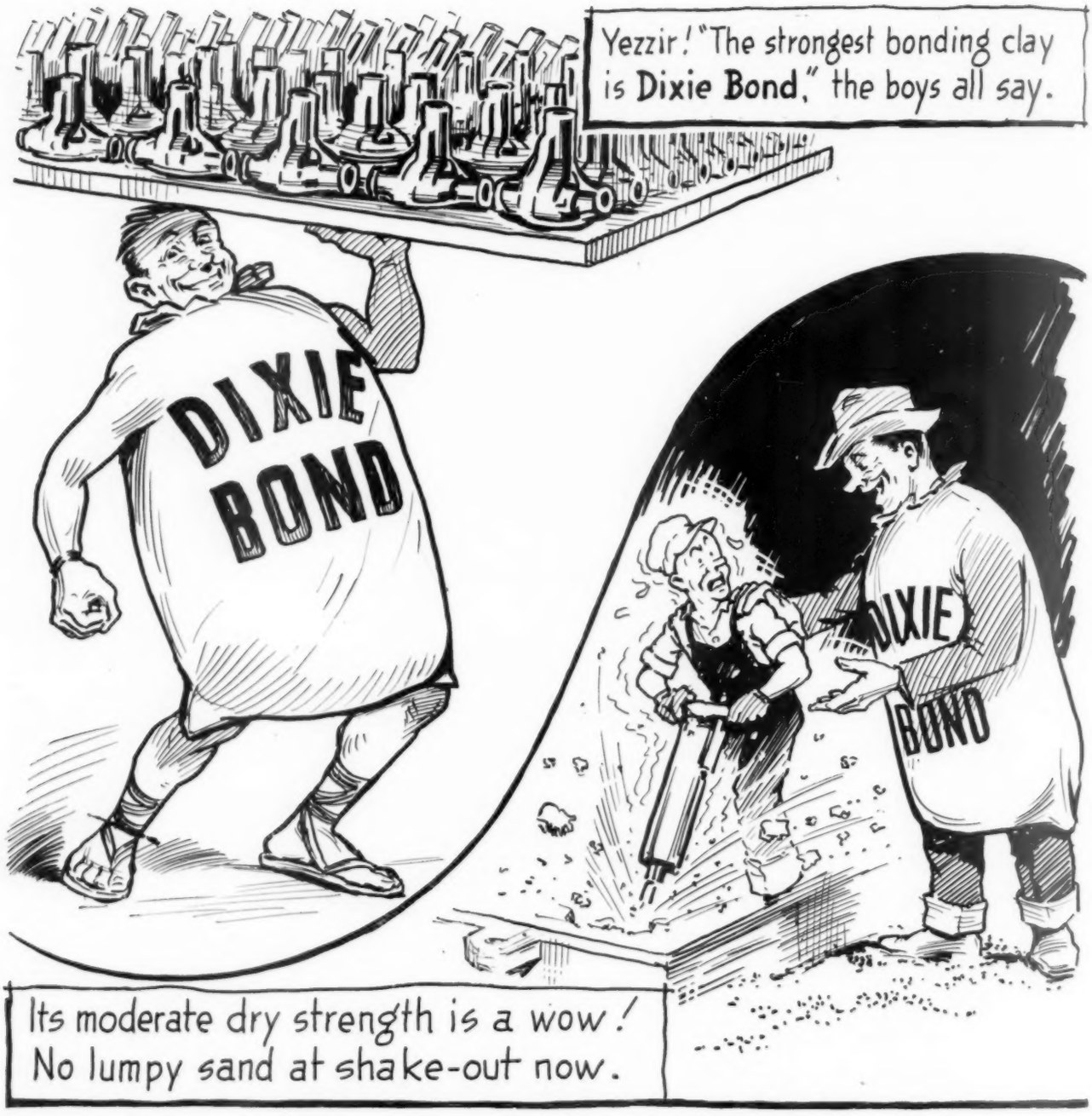
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DETERMINES CARBON
In Cast Iron and Steel

By J. G. DONALDSON
Research Engineer
Battelle Memorial Institute
Columbus, O.

PRESENT accepted method of determining combined carbon in cast iron consists of the determination of total carbon and graphite carbon, the combined carbon being the difference between those values. This method has the disadvantage of requiring hours rather than minutes to perform, and the entire burden of error is thrown on the combined carbon figure. This procedure gives erratic results, as may be verified from figures given in the U. S. Bureau of Standards certificates, the results of which are given in Tables I and II on this page.

The direct method herein outlined has the advantage over the present method in speed and accuracy, as each determination can be completed in 15 minutes and with good precision.

Silver Nitrate for Catalyst

The method consists of solution of the sample in a dilute nitric-sulphuric-phosphoric acid mixture, containing a small amount of silver nitrate as a catalyst. Oxidation of the combined carbon is accomplished by boiling with a hot solution of ammonium persulfate, and passing the evolved carbonaceous gases through heated copper oxide. After removal of sulphur gases and water, the evolved carbon dioxide is absorbed in ascarite and weighed.

The procedure is carried out in a closed system to prevent escape of any organic gases evolved in dissolving the sample.

A dilute solution of nitric-sulphuric-phosphoric acid, containing a small amount of silver nitrate as a catalyst, was found most suitable for the determination. For the first tests, a sample of white iron, which had been previously analyzed, was used. This was selected because of its high combined carbon content, much higher than normally found. When this could be determined with consistently precise and quantitative results, the experiment was continued to cover the available Bureau of Standards samples of cast iron and also several Bureau of Standards samples of steel. In the latter case, the carbon recovered represented the total carbon present in the steel. Some steel samples containing small amounts af alloying elements were tried with good results, except in the case of chromium steel. One per cent chromium in the steel was found to defeat the determination, as the metal was not completely dissolved in the acid, and the results were low.

The apparatus (shown in the accompanying illustration) consists of a 250 milliliter flask (*A*) with standard taper neck. A 125 milliliter funnel (*B*) extends down through the ground glass stopper to ½-inch or 12 millimeters from the bottom of the flask (*A*). A coil condenser (*C*) is welded to the stopper and extends over and down into a 250 milliliter gas washing bottle (*D*) containing 150 milliliters of a saturated aqueous solution of chromic acid. The outlet from the gas washer is attached to a glass tube (*E*) filled with copper oxide and extending upward into an electric coil heater (*F*).

After the copper oxide tube, the apparatus consists of: a Fleming washer (*G*) containing 35 milliliters of sulphuric acid saturated with chromic acid; a second Fleming washer, empty to remove spray, a Stetser-Norton absorption bulb (*J*) charged with barium perchlorate drying agent; and a second Stetser-Norton absorption bulb (*K*) charged with ascarite to collect the CO_2, which is measured gravimetrically.

All glass construction is necessary until after the copper oxide tube, because gum rubber connections are immediately attacked by nascent oxygen giving a non-reproducible blank. Rubber connections, however, may be used after the copper oxide tube.

Weigh 2.727 grams of sample into flask (*A*). Heat the copper oxide tube to 300-310 degrees Cent. and pass oxygen through the train at a rate of about 250 milliliters per min. for a few minutes. Close stopcock between funnel (*B*) and flask and attach a weighed ascarite bulb to the train.

Remove the oxygen line and pour 40 milliliters of dissolving acid into the funnel. This dissolving acid consists of 5.25 grams of silver nitrate ($AgNO_3$), 1800 milliliters of water, 500 milliliters nitric acid (HNO_3), 160 milliliters sulphuric acid (H_2SO_4) and 200 milliliters phosphoric acid (H_3PO_4).

Solution Is Boiled

Force the acid into the flask under pressure by reconnecting oxygen supply and opening stopcock. When the first violent action has subsided, place a low flame under the flask and boil gently until sample dissolves and nitrous gases disappear.

Remove flame and disconnect oxygen supply. Dissolve 5 grams of ammonium persulfate in 100 milliliters of boiling water and pour into the funnel (*B*). Open stopcock and force into the flask by reattaching the oxygen supply.

Boil the solution for 4 minutes, then remove flame. Sweep out the system with oxygen for another 4 minutes, remove ascarite bulb and weigh. The increase in weight represents the combined carbon as CO_2.

Tables I, II, III and IV show the results obtained by the presently accepted and the new methods. Table I shows

This article is taken from a paper presented by the author at the annual convention of the American Foundrymen's Association held in Cleveland, April 20 to 24, 1942.

Table I

Standard Cast Iron

Combined Carbon, per cent

B. of S. Sample No.	Bureau of Standards Certificate Results Maximum	Minimum	Recommended Value	B.M.I. Method
122	0.78	0.70	0.74	0.70
122	0.78	0.70	0.74	0.76
6d	0.77	0.61	0.66	0.67
6d	0.77	0.61	0.66	0.68
7c	0.48	0.40	0.44	0.42
7c	0.48	0.40	0.44	0.43
4e	0.52	0.43	0.48	0.47
4e	0.52	0.43	0.48	0.47

Table II

Standard Steels

Combined Carbon, per cent

B. of S. Sample No.	Bureau of Standards Certificate Results Maximum	Minimum	Recommended Value	B.M.I. Method
16c	1.02	1.00	1.01	0.97
16c	1.02	1.00	1.01	1.01
20d	Provisional Certificate		0.411	0.430
20d	Provisional Certificate		0.411	0.434
9c	0.206	0.198	0.202	0.202
9c	0.206	0.198	0.202	0.206
130	0.460	0.448	0.454 (Pb steel)	0.480
30c	0.503	0.481	0.489 (Cr-V steel)	0.306**
111	0.207	0.196	0.202 (Mo-Ni steel)	0.213

** Chromium steel not soluble in the acid mixture used.

the results obtained on Bureau of Standards certificated samples of cast iron and Table II shows the results obtained on similar samples of steel. Table III shows the results obtained on routine laboratory samples while Table IV shows a comparison of the results obtained by the two methods by an independent operator.

Table III

Laboratory Cast Iron

Sample No.	Combined Carbon, per cent Recorded Value*	B.M.I. Method
A	0.41	0.40
B	0.37	0.37
C	0.08	0.08
D	0.38	0.38
E	0.47	0.47
F	0.44	0.49
G	0.48	0.49
H	0.25	0.27
I	0.66	0.61
J	0.44	0.45
K	0.20	0.21
L	0.20	0.20

*The "recorded value" is that previously obtained by difference, total carbon-graphitic carbon, during routine analysis of the samples.

Table IV

Independent Operator

Sample No.	Combined Carbon, per cent Recorded Value*	B.M.I. Method
M	0.34	0.33
N	0.38	0.39
O	0.48	0.46
P	0.44	0.43
R	0.74	0.76
S	0.25	0.26
T	0.23	0.25

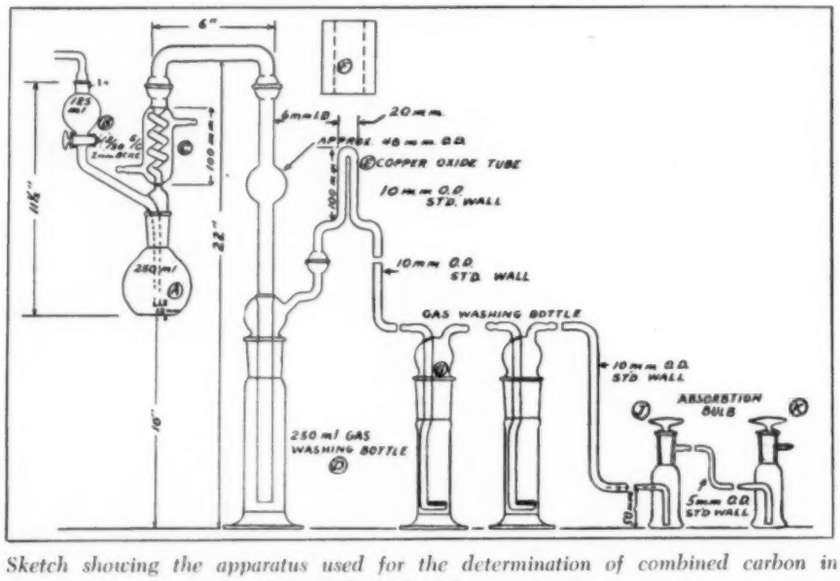
*The "recorded value" is that previously obtained by difference, total carbon-graphitic carbon, during routine analysis of the samples.

In Tables III and IV, the "recorded value" is that previously obtained by difference, total carbon-graphitic carbon, during routine analysis of samples.

Speeds Inspection Of Small Parts

An inspection machine has been placed in operation at the Westinghouse Lamp Division plant, Belleville, N. J., which has speeded the inspection of metal lamp bases as much as 400 per cent. The device was designed by Westinghouse engineers to save inspectors the tedious task of picking up each lamp base to check it for possible flaws. Now screw-type metal cylinders are turned over automatically as they jiggle down a sloping table which is vibrated by a motor underneath.

Previously inspectors sat beside a conveyor belt and as the metal lamp bases passed along, picked up each base to inspect both sides. In the new process, the iron bases are carried by a conveyor belt to the end of a sloping metal table where they are dumped. Each base rolls into one of 18 parallel grooves which extend half the length of the table. The table's vibrating motion and downward slope causes the bases to move along while the operators inspect the top sides. Then each base enters a short turnover tube consisting of several pieces of steel in spiral shape. The spiral turns each base up-side-down so the inspectors can see the other side without picking up any but defective bases. At the lower end of the table, the bases fall off into barrel and are packed for shipping.



Sketch showing the apparatus used for the determination of combined carbon in cast iron and steel and its arrangement

Pipe Manufacturer Wins Two Awards

National Cast Iron Pipe Co. division of James B. Clow & Sons, Birmingham, has been presented the service flag of the War Department for its excellent record made in making 155-mm shells. The presentation was made Saturday, Feb. 6, at the company's plant in Tarrant City, a Birmingham suburb, by Capt. J. Edwardson, representing Under Secretary of War, Robert P. Patterson. There were several officers from the Birmingham Ordnance Department, officials of the company, employes, and a large number of citizens present. As part of the ceremony, the company also received as permanent owner a safety trophy for its 5-year safety record. For more than 4 years the company has not had a lost time accident. Last September the perfect record was marred by three lost-time accidents. However, these were not sufficient to cause the company to lose the coveted first-place trophy. J. Warren Whitney, manager of the local plant, and C. J. Day, vice president, James B. Clow & Sons, in responding to the presentation speeches, stressed the necessity for strict observance of safety practices and the vital part safety plays in the war effort.

Book Review

Process Practices in The Aircraft Industry, by Frank D. Klein, Jr., senior metallurgist, Materials Control Branch, United States Army Air Forces; 266 pages 6 x 9 inches; 46 illustrations; published by McGraw-Hill Book Co., Inc., New York. Price $2.75.

The book is designed to inform aircraft workers and students of current process practices necessary for the production of aircraft war materials as well as details regarding these processes. The work covers aircraft processes from the raw material stage to the finished product and includes in its scope procurement of raw materials, method of identification for production storage, typical physical and chemical properties and chemical and physical processes. Practical production test methods are included as a subject for control of quality. The work under 23 chapter headings is presented in five parts: Characteristic aircraft raw materials, aircraft metals in production, aircraft fabrics and compositions, aircraft process materials, standard process methods.

Porbeck Mfg. Co., 2019 Broadway, St. Louis, manufacturer of core and industrial ovens, has purchased a plant at 2600 North Ninth Street.

PATTERN PLATES AND COPE AND DRAG BOARDS

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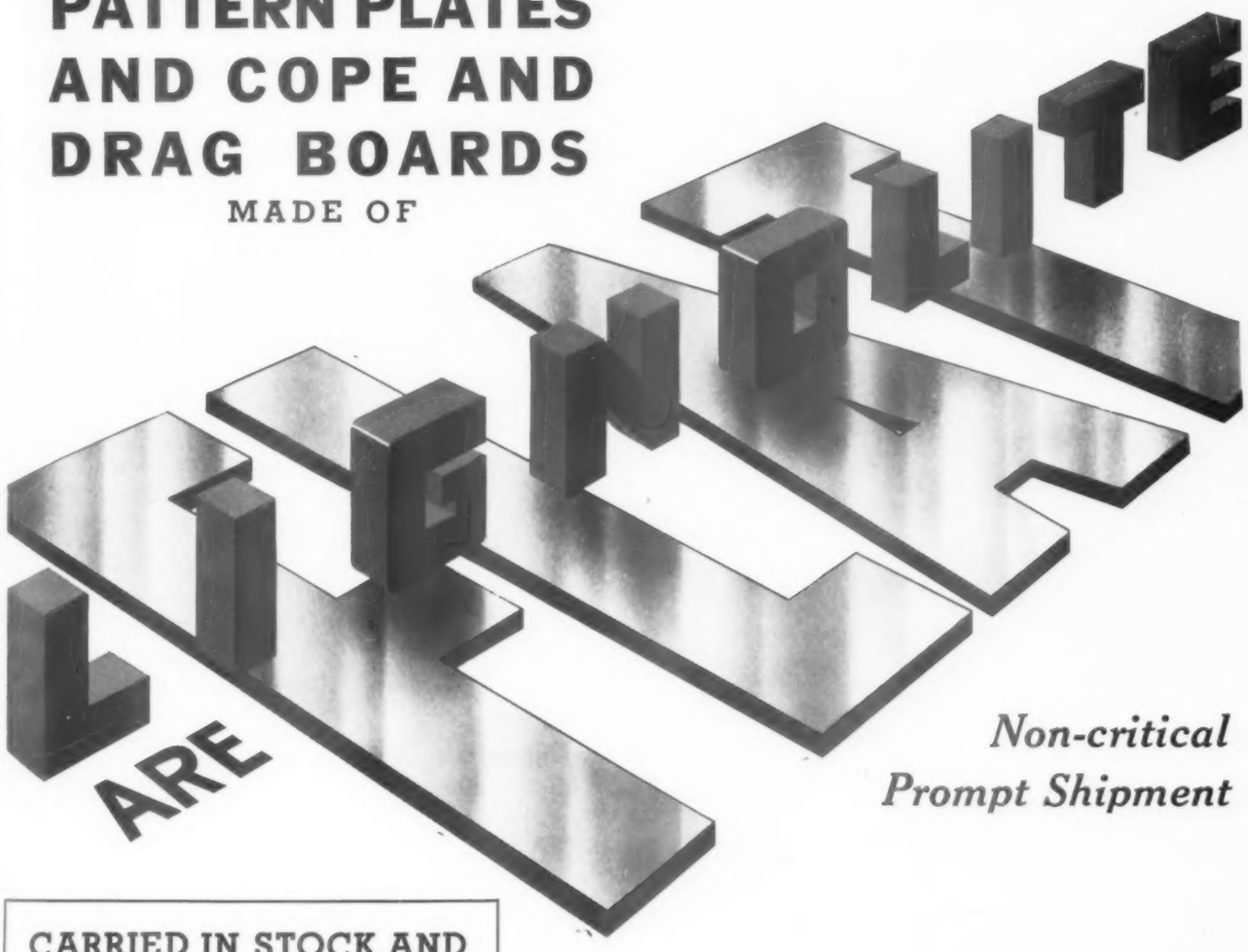

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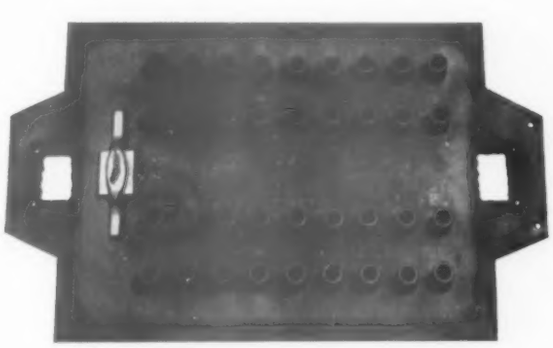

Mounted LIGNOLITE Pattern Plate

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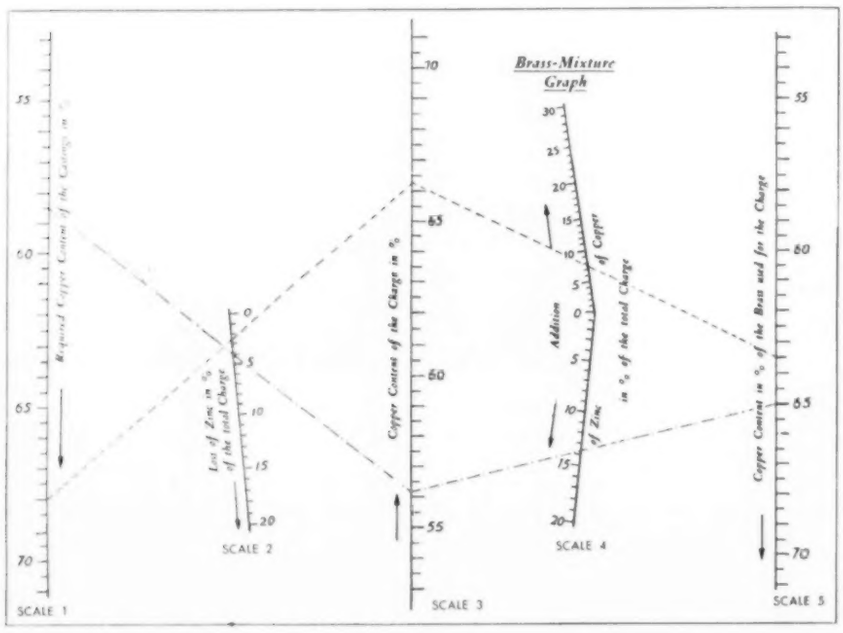
Develops Chart to Compensate

ZINC LOSS IN BRASS

ALLOWANCE made for zinc loss in brass is an important factor in controlling composition. By means of the accompanying chart developed by Foundry Services Inc., New York, it is possible to determine quickly the amount of copper or zinc to be added to available raw material to obtain a predetermined alloy. The chart has five scales as may be observed. Scale 1 shows the copper content of the required alloy. Scale 2 indicates the zinc loss in per cent as found by experience. Scale 3 gives the copper content of the total charge with copper or zinc added prior to casting. Scale 4 indicates the percentage of zinc or copper, whichever is necessary, to be added to obtain the desired alloy. Scale 5 indicates the copper content of the charged metal prior to melting.

Use of the chart is explained best by examples, and one selected requires a brass containing 68 per cent copper. Zinc loss as determined by experience is 2.5 per cent of the charge. Brass charged has a copper content of 63.5 per cent. What must be added to get the desired alloy? Procedure is lay a ruler or straight edge from 68 the copper content of the required alloy on Scale 1 so that it intersects Scale 2 at 2½ which is the zinc loss, and also Scale 3 at some point. Then the straight edge is used to join that point and 63.5 on Scale 5 which is the copper content of the charged metal. The line formed by the straight edge intersects 4 at 7.7 which indicates that 7.7 pounds of copper must be added per 100 pounds of charged metal to obtain the correct alloy.

A second example requires brass castings containing 58.5 per cent copper. Zinc loss experience is 4 per cent. Charging metal contains 65 per cent copper. What must be added to get the required alloy? Method is to lay the rule from 58.5 on Scale 1, the copper content in the required alloy, so that it intersects 4 on Scale 2, the zinc loss, and also some point on Scale 3. Join that point with 65 on Scale 5, the copper content of the charge metal. The line connecting the two points intersects Scale 4 at 13.7 which indicates that 13.7 pounds of zinc must be added per 100 pounds of charged metal to obtain the desired alloy. Obviously, if the copper content of the finished alloy is determined by working backward on the chart, the zinc loss can be regulated.


Brass-Mixture Graph
Required Copper Content of the Castings in %
Loss of Zinc in % of the total Charge
Copper Content of the Charge in %
Addition of Copper in % of the total Charge
Addition of Zinc in % of the total Charge
Copper Content in % of the Brass used for the Charge
SCALE 1
SCALE 2
SCALE 3
SCALE 4
SCALE 5

WPB Surveys Brass And Bronze Shops

WPB copper division expects to be able to allocate secondary alloy ingots and scrap to brass foundries more efficiently after the returns to the survey of brass and bronze foundry's facilities on WPB form 2231 are tabulated and studied.

Up to now the copper division has been allocating copper bearing material to some 3000 foundries every month without having a picture of each foundry's ability to use this material efficiently for war work.

Foundries have been asked to indicate on the questionnaire the type, number and capacity of furnaces; laboratory facilities available, number of molders and type of molding equipment employed on each shift. Information is required on dimensions and amount of core oven capacity and the number of core makers employed.

Each foundry is asked the minimum and maximum size castings which can be produced by any of the following casting methods: Sand cast, centrifugal, permanent mold, die and plaster. Management also is asked to describe in detail the type of castings which the plant may produce best with the present facilities. Foundries must report types of copper and copper base alloys they have experience in handling. For example, silicon bronze, high lead (bearing bronze) and aluminum bronze.

Facilities for rough machining and finishing machining, aside from grinding, must be indicated on the report. WPB wants to know what facilities are available for the production of patterns.

Book Review

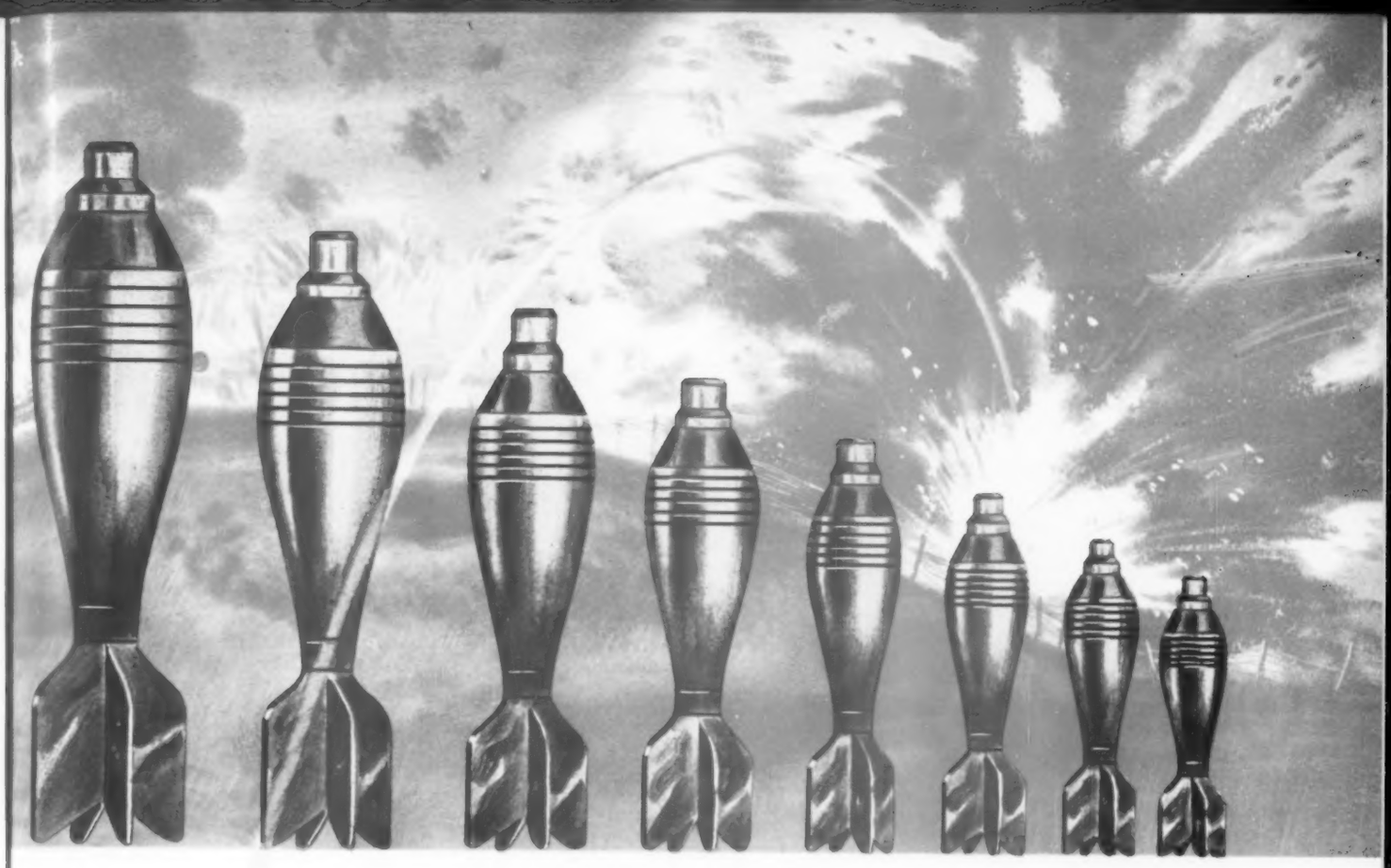
Abrasive Grains and Their Uses, by Johnson Heywood, paper, 72 pages, 6 x 9 inches, published by the Penton Publishing Co., Cleveland, price $1.

This interesting and informative booklet, prepared under the auspices of the Abrasive Grain Association, describes in condensed form the best methods of using abrasive grains for various purposes. Since the field of use for abrasive grain is extensive, it would be difficult to describe in detail all the applications. Therefore, a few typical examples of the effective use of abrasive grain in various jobs were selected and described with sufficient detail to be helpful in guiding the reader to a solution of his own problems.

The booklet is divided into six chapters of which the first describes the various abrasive grains and their characteristics. The second chapter discusses materials used for polishing, flexible grinding and buffing, while the third chapter describes the methods used for those operations. Chapter IV is concerned with lapping with abrasive grain, and chapter V illustrates use of abrasive grain in the glass and optical industries. The final chapter discusses miscellaneous uses of abrasive grain.

Awarded White Star

Howard Foundry Co., Chicago, has been awarded a white star to be added to the Army-Navy "E" pennant which it received 6 months ago in recognition of the high standards of production that have been maintained. The distinction covers the three plants of the company in Chicago and Aurora, Ill.



HOW OSBORN SPEEDS PRODUCTION OF *Mortar Bombs*

"JAP-BUSTERS," the marines on Guadalcanal called them—a tribute to the effectiveness of our trench mortar bombs in blowing the enemy out of dense cover and difficult terrain.

Moulded on Osborn machines, the cast steel bodies for these mortar bombs now are flowing from foundries in the United States and Canada by the tens of thousands. But accuracy in the field demands precision at home.

If the finished casting is a gram or two overweight, it sometimes can be salvaged by grinding; if it's underweight, it must be scrapped.

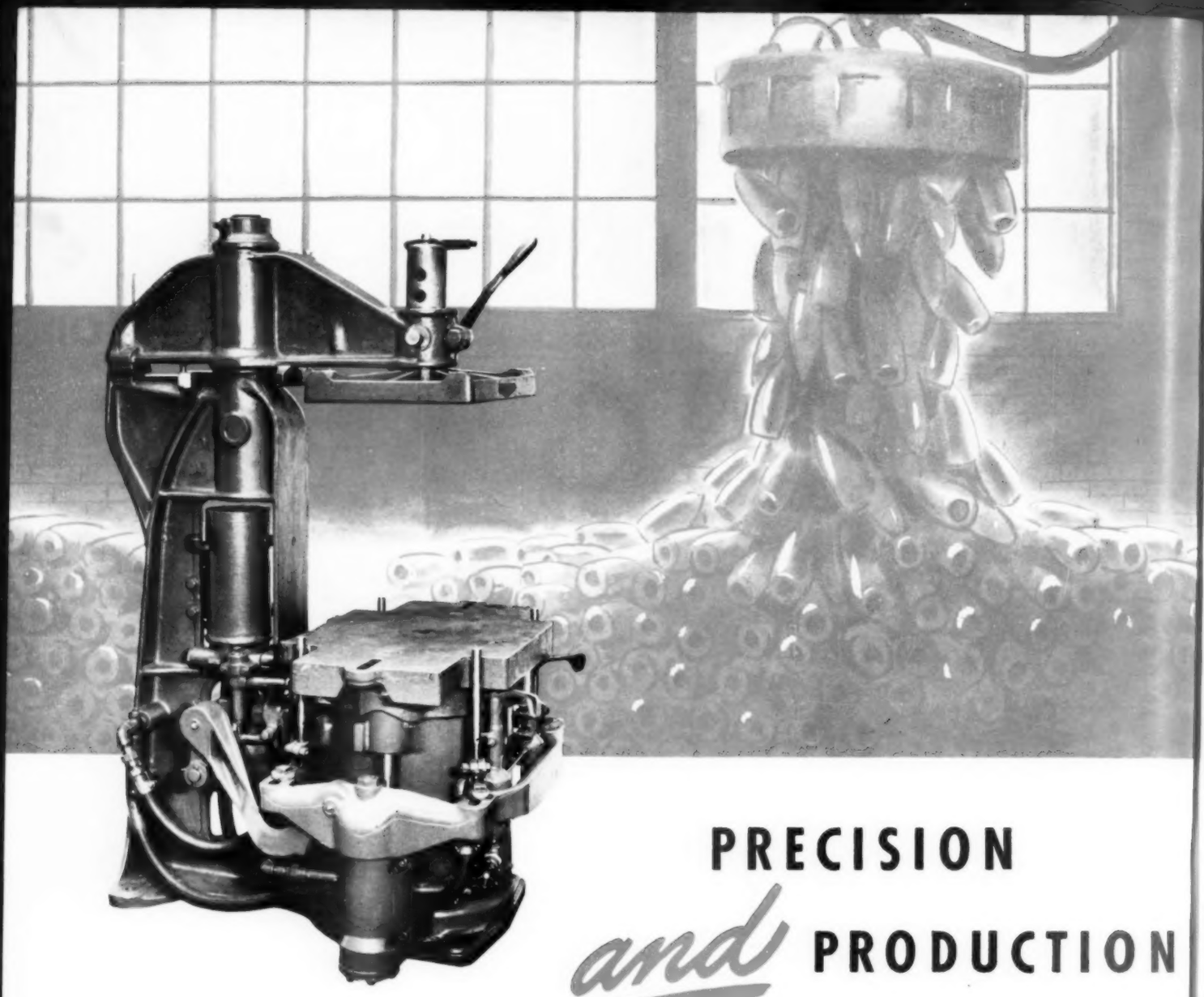
Precision *and* Production—these are the prime requisites in the moulding of trench mortar bomb bodies. Both are obtained with Osborn Moulding Machines of the 716-PJ Jolt Squeeze Stripper type shown on the following page.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

OSBORN

MOULDING MACHINES



PRECISION *and* PRODUCTION

BATTERIES of Osborn Moulding Machines of the 716-PJ type, Jolt Squeeze Stripper shown above, are speeding production of accurate, uniform, cast steel bodies for trench mortar bombs.

Precise size and weight specifications are met by the close control and positive action characteristic of Osborn Moulding Machines.

Volume Production is achieved through rugged design, simplicity and speed of operation.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

OSBORN

MOULDING MACHINE

Foundry Developments at short range

EXPERIMENTAL results obtained in an English investigation of two alloy and one plain carbon steels confirm the conclusions of Musatti and Reggiori that internal defects of a hairline crack nature can be produced in solid steels by soaking in hydrogen at high temperature, followed by rapid cooling through the Ar_1 point. Cracks are not formed immediately after quenching, but an aging period is required, a phenomenon which suggests that the cracks are not due solely to stresses resulting from the drastic heat treatment to which the specimens were subjected. Similar heat treatment in vacuo or in nitrogen followed by water quenching does not cause such defects.

♦ ♦ ♦

In aluminum-magnesium alloys containing appreciable amounts of magnesium considerable difficulty is encountered in the molten state due to the ease with which the magnesium is oxidized. However, a recent patent claims that additions of small amounts of lithium and beryllium reduce losses of magnesium to an extremely low point. The total of lithium and beryllium should not be over 0.3 per cent, and may be higher in lithium than in beryllium.

♦ ♦ ♦

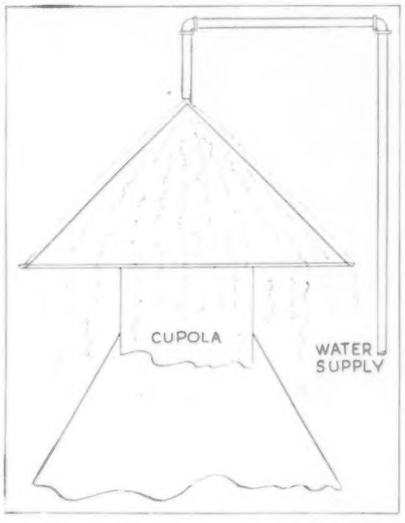
Previously mention has been made of the use of a porous connector between the interior of a blind riser and the permeable portion of a mold to assure the performance of the riser in its proper function of feeding a casting. The theory of application of the porous connector was that it permitted atmospheric pressure to act on the molten metal within the blind riser forcing it into the casting. However, a recent patent describes another procedure to obtain a similar feeding effect, but based on a different premise—that of breaking the vacuum formed within the blind riser after solidification commences through the use of a liquidizer. Simplest liquidizer is a small wood dowel rod ⅛ to 3/16-inch in diameter about 1 inch long which projects into the cavity of the blind riser.

♦ ♦ ♦

An alloy addition to copper-base materials such as brasses and bronzes which is claimed by its inventor to provide good deoxidation and desulphurization contains 0.50 per cent iron, 1.25 per cent manganese, 0.25 per cent vanadium, 0.25 per cent titanium, 0.10 per cent beryllium, 1.0 per cent calcium, 30 per cent copper and 67 per cent zinc. About 10 per cent of the alloy is added during melting.

♦ ♦ ♦

War Production Drive Committee, Washington, received from Nathan Swords, Caterpillar Tractor Co. Peoria, Ill., the following suggestion: That the foundry cupola be equipped with an inverted cone over which water would run during a blackout. As soon as the sparks come into contact with the water, they turn black and thus hide the cupola from view. His scheme is shown in the accompanying illustration. Comment was that the device is not practical where a large amount of wind pressure is used on cupola, but it is believed that it might be useful in smaller foundries.



♦ ♦ ♦

Recent patents describe the use of ladle additions to cupola melted iron which result in increased transverse and tensile strengths, and deflection, and in reduction of chill. One of the materials contains 60 to 80 per cent silicon, 1 to 4 per cent calcium, 5 to 10 per cent vanadium, 4 to 10 per cent manganese, and remainder iron. The other contains 60 to 80 per cent silicon, 1 to 4 per cent aluminum, 1 to 4 per cent calcium, 4 to 9 per cent zirconium, 4 to 9 per cent manganese, and remainder iron. About 0.5 per cent of the addition is made, and it is suggested that the silicon be reduced in the cupola charge to compensate for that added by the ladle addition.

♦ ♦ ♦

Deleterious effect of water on aluminum and its alloys is illustrated strikingly by the statement that one drop will gas several hundred pounds of molten metal. Hence, it will be well worthwhile to see that all skimmers, etc. are perfectly dry before being introduced into the pot or crucible. The same should be observed in adding fluxing agents if they are used.

♦ ♦ ♦

Production of solid steel castings often involves use of chills and chunning, not to mention heavy risers and gates, but one enterprising inventor proposes to eliminate the first two and decrease the second two by cooling molds and cores by use of refrigerated air. The patent describes the application of cooling air and states that the temperature of the air may range from 70 degrees below zero Fahr. in the case of heavy castings to above 32 degrees Fahr. in the case of light castings.

♦ ♦ ♦

A suggestion to the War Production Drive Committee, Washington, submitted by R. F. Schepis, Republic Aviation Corp., Farmingdale, L. I. points out that the practice of using sand molds for making drop hammer dies in the aircraft industry is quite common. However, use is limited to one-piece molds of somewhat simpler shape. Mr. Schepis, a plaster modeler, has arrived at a composition of plaster and asbestos which it is claimed provides an excellent material for making molds of complicated form, which formerly were considered practically impossible through use of sand. The plaster composition for drop hammer molds is comprised of two parts plaster and one part furnace asbestos powder with sufficient water to suit.

READER'S COMMENT

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Coke More Important

TO THE EDITORS:

In the questions and answers section in the February issue of THE FOUNDRY, a gentleman asks "How to Increase Carbon in Cupola Iron." The one point that occurs to me is that he is running a continuous tap with a front slagging spout. The type of scrap would also be another contributing factor. He might be using very heavy chunky pieces which are of the low carbon variety. He must be using steel to necessitate the use of both briquettes and ferroalloys.

On page 96 another gentleman desires to get hot iron from a small cupola. One of the first things that comes to my attention is the fact that he only delivers 1200 cubic feet per minute of air to the cupola whereas the amount of coke he is using is over twice the amount required. This fact alone would slow down the melting, causing cold iron. The coke should be sized so that none of the particles are over 2 inches, which seems to be the accepted size for a cupola this small. You do mention the sizing of the iron, but I feel that the sizing of the coke is more important. Not that he could use 100 pound slugs of iron, but more heat is obtained from the coke by exposing more surface to combine with the oxygen.

In the preparation of the bed, I would suggest that it be burned through very hot, in fact after the natural burn, then turn on the blast so that the bed is white hot. When the 36 inch bed is obtained then start the charging with 400 pound iron charges and 45 pounds of coke for splits and when the cupola is full, turn on the blast immediately, eliminating the soaking time. I have found this procedure to work very satisfactorily on cupolas of this size. It would be a good suggestion that they have a pressure gauge on the wind box to give an approximate idea of what is taking place during the heat.

A. J. EDGAR,
Technical Advisor
Gray Iron Founders' Society, Inc.
1341 *Connecticut Avenue, N. W.*
Washington

Problems Solved

TO THE EDITORS:

I wish to compliment you on the wonderful work you are doing in publishing THE FOUNDRY. We started a foundry a little over a year ago, with very little experience. We built some of our own foundry equipment, using the book "Melting Iron in the Cupola" as a guide. Thus far we have succeeded in solving any operating difficulties that have arisen through the questions and answers page in THE FOUNDRY.

We wish to thank you very much for the valuable information we have received through your publication.

G. A. WEBSTER
Unity, Saskatchewan

Glass Is Cause

TO THE EDITORS:

On page 86 in the January issue of THE FOUNDRY, I noticed a short article under the heading of "Trouble is Caused By Slag Action." I find that this difficulty prevails in many nonferrous foundries that use glass as a cover for the metal. In any sense, the glass cannot be considered as either a degasifying or a deoxidizing flux used for improvement of the metal.

As a general rule, the trouble is caused by the cutting action of the molten glass from the swirling motion set up on top of the molten metal by the high air velocity. This condition seems to prevail with practically all mixes and does not seem to be limited to a mix with a lead content, which would be assumed a chemical action.

D. H. LUCAS
1511 *Touhy Avenue*
Chicago

Stop the Slag Wool

TO THE EDITORS:

The undersigned would like to refer to the Question and Answer under the subheading "Wool Formed at the Slag Hole May Be Handled in Several Ways," published on page 82 of the November issue of THE FOUNDRY.

It is stated therein "slag wool flying freely from the cupola slag hole always has been regarded as an indication that the melting process is going forward in a highly satisfactory manner. For that reason the slight nuisance created by adherence of wool to walls, beams and roof has been tolerated as a necessary accompanying evil."

As a reader of your journal for many years and also having spent most of that time in connection with cupola control, the writer is tempted to say in the English vernacular "don't you believe it!"

The fact that slag may wool freely under *certain conditions* of cupola operation *may* indicate good fluxing conditions, but to the writer, the formation of slag wool is more likely to indicate air leaks (often due to cracks in welded joints) through the air belt near the slag hole, or to an incorrectly made slag hole, allowing air to leak around the hole and so blowing the slag into wool.

It is submitted that efficient cupola practice and good housekeeping should not permit the formation of slag wool.

If one wishes to snap judge cupola practice by slag the correct symptoms to look for are free flowing slag associated with high temperature.

H. H. SHEPHERD,
Metallurgist and Foundry Consultant
Palmerston House
Bishopsgate
London, E.C.2., England

Book Review

Chemical Analysis of Ferrous Alloys and Foundry Materials, by E. C. Pigott, cloth, 362 pages, 5½ x 8½ inches, published by Chapman & Hall Ltd., London, England.

This book is arranged differently from the usual book on analysis. It is more than just another volume on methods and procedures since the author reviews possible approaches with their advantages or disadvantages, and then describes the most suitable. It is designed primarily for the plant analyst who necessarily must combine accuracy with speed in obtaining results, but the student also will find it well worthwhile. Many of the methods and procedures described only have been presented previously in technical journals, and others are based on original research by the author.

Analytical procedures described deal with 28 elements which may be found in iron and steel and they include the usual elements as well as those of more recent application such as boron, beryllium, cerium, selenium, tellurium, etc. The various elements are arranged in alphabetical order beginning with aluminum and ending with zirconium. Information on the extraction, general and chemical properties, and application of each element precedes the actual methods of analysis, and as previously mentioned some data are given on the evolution and theory underlying the methods.

In addition to the section on analysis of ferrous materials the book contains a section giving tables of elements, symbols, atomic numbers, atomic weights, and isotopes which also includes definitions, principles and explanatory dates. Also included is a section on analytical procedures for refractory materials used in foundries and steel plants.

These illustrations from photographs taken by the Rochester Gas Co. show crucible furnaces in operation in the Anstice Foundry, Rochester, N. Y. The fuel used is manufactured gas of 537 BTU, using multiple burners. Crucibles are standard, No. 125 long lip. Twelve analyses of copper alloy ingot are melted in addition to four analyses of aluminum, including heat treated aluminum. Melting time is approximately 45 minutes per 375 lbs. high copper alloy.

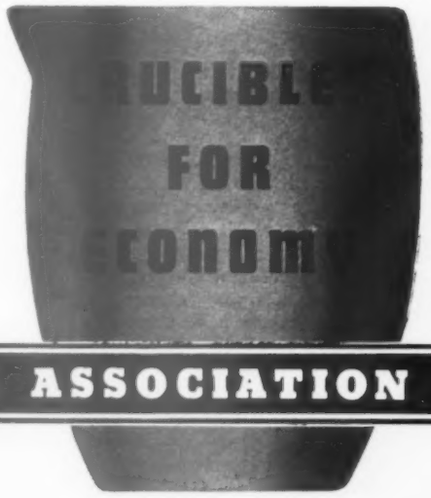
Typical CRUCIBLE FURNACE INSTALLATIONS

With the Nation in an all-out war, foundry management is keenly aware of the value of crucibles for melting nonferrous alloys. Their use insures big production with the necessary flexibility. One of several fuels may be selected depending on your location. Reasons for the use of crucible furnaces include, (1) Clean, gas-free metal can be rapidly produced. (2) The alloy may be changed whenever desired. No absorbed metal remains to contaminate the next melt. (3) Melting cost with crucible furnaces, either stationary or tilting type, is well recognized to be the lowest by far.

When you consider buying nonferrous melting equipment, be sure to consult a crucible furnace manufacturer.

* *Photos and Data solicited on other Foundries using crucibles*

* *No. 1*



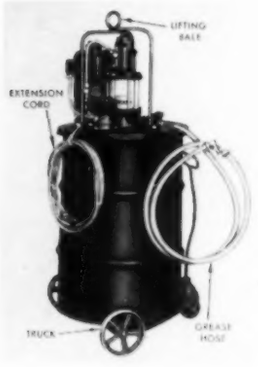
CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK, N. Y.

new equipment and supplies

Grease Pump

Trabon Engineering Corp., 1814 East Fortieth street, Cleveland, recently has introduced an electric-hydraulic barrel pump, as shown in the accompanying illustration. The unit has auxiliary gear mounted rigidly on a flanged head which fits snugly over a standard 55 gallon drum. Oil or grease may be pumped from the original container without rehandling. The unit may be transferred from drum to drum with a hand hoist



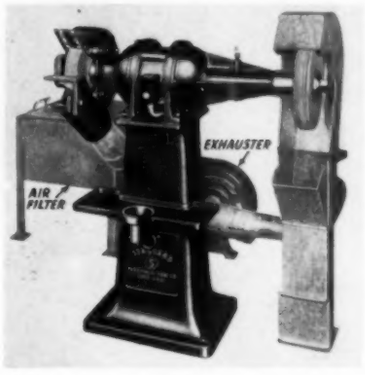
or lifting bar. The pump is operated by a ½-horsepower motor direct connected to the hydraulic pumping unit in the bottom of the reservoir. The motor may be operated from any light socket. Oil from the reservoir is pumped through a reversing mechanism which operates the double acting piston to maintain continuous discharge. The pumps are available in six different discharge capacity and pressure combinations. The pump may be employed in greasing molding machines and other equipment in the foundry, thus providing uniform application of grease to all machines in the plant.

Control Station

Wilson Welder & Metals Co., New York, recently has developed a control station in capacities of 75 and 150 amperes connected in series with the welding circuit of any constant potential arc welding generator. It is claimed most conventional drooping voltage generators can be converted quickly to constant potential through a quick change switch. A portable switch gives the operator remote control of the welding current. Two or more welding arcs may be operated simultaneously. Each operator has choice of two methods. He can set the unit to deliver a definite current at the arc, or he can use the hand switch to vary the current. A 400 ampere generator will serve five or six 75 ampere stations, or three to four 150 ampere stations. Each operator can draw precisely the amount of current he needs, up to the capacity of his station regardless of current drawn by other welders at other stations.

Grinder and Buffer

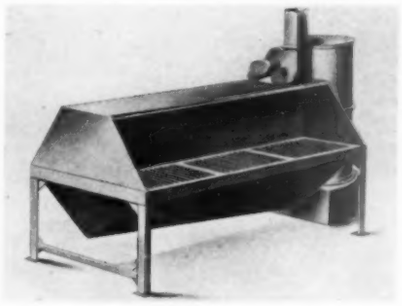
Standard Electrical Tool Co., River Road, Cincinnati, has developed a combination grinding and buffing machine, as shown in the accompanying illustration, which features exhausting equipment for collecting grinding and buffing particles. Machines are available in 1, 2, 3, and 5 horsepower capacities. The left side has a safety hinge door wheel guard adjustable to wheel wear and fitted with adjustable spark breaker and work rest. The spindle is mounted in



three heavy duty ball bearings and the buffer end is fully enclosed. Tool tray and removable water pot are fitted in front of the pedestal. Dust arrester assembly includes material handling fan, blower, air filtering stand and adjustable exhaust hood for buffing wheel. Machine motor and fan motor operate simultaneously through push button starting equipment. The dust collecting system is available separately for application to any type of grinding, buffing, polishing equipment.

Dust Collection

New collection and recovery methods for use in magnesium foundries, recently have been developed by the Claude B. Schneible Co., Chicago. All the metallic particles are, in a multiwash unit, immediately coated with a high flash point mineral oil and thus are rendered harmless. The heavier particles are submerged in the oil bath and are carried away to the settling tank; while the lighter or float dust particles are collected in

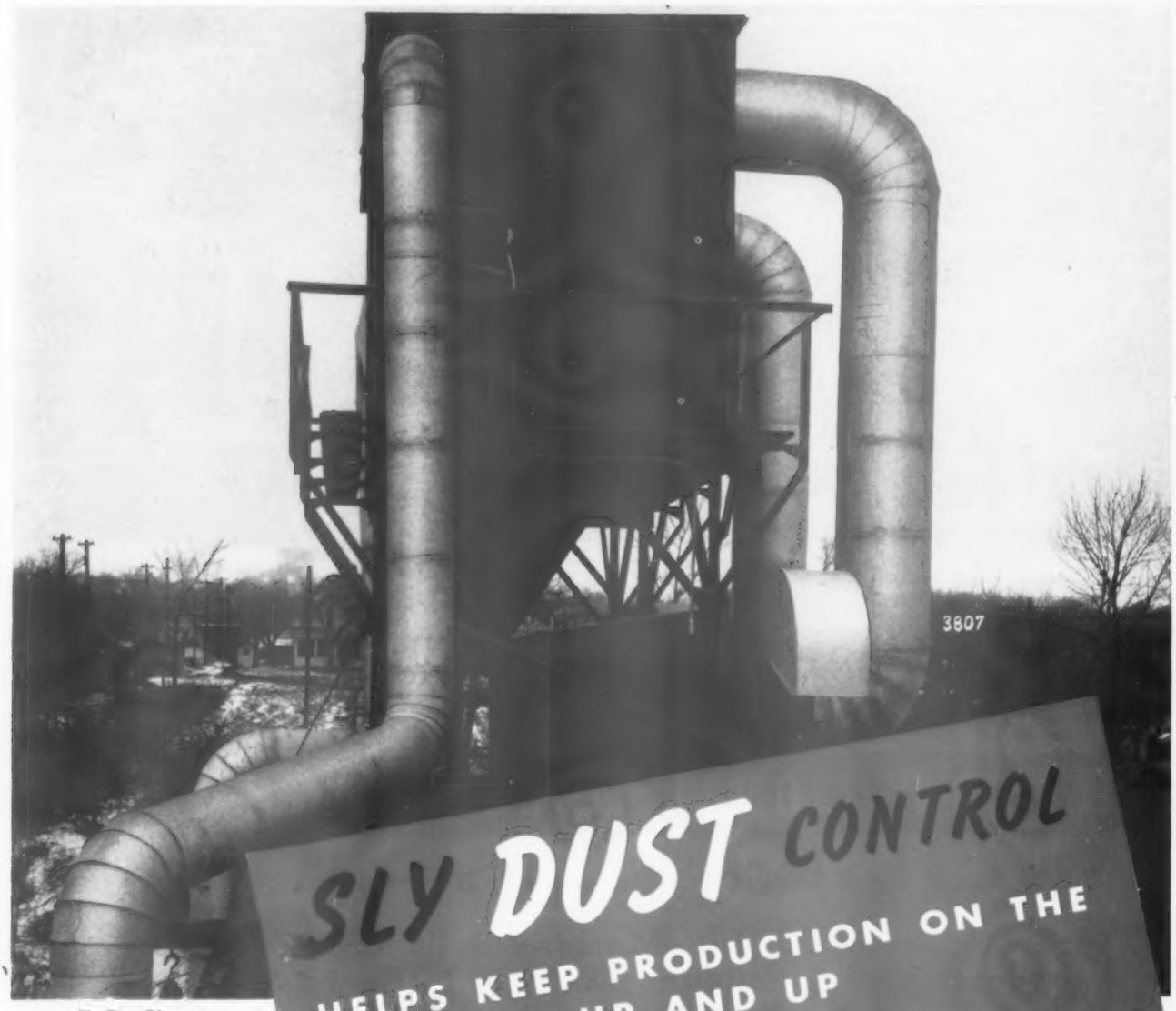


the unit for deposit in the tank. In addition to the elimination of danger from fire and explosion, another advantage of the newly devised system for aluminum-magnesium metal working plants is the salvaging of all metal dust. Every bit of magnesium dust is recovered which effects a material metal saving.

For operations on magnesium castings such as hand grinding, chipping, burring, etc., the Schneible company has developed several types of downdraft ventilating benches. These benches have hard wood gratings of proper area to suit the work. Canopies and end sheets guard against side drafts. Downdraft grinding benches are made with a "V" shaped hopper at the bottom which also forms the exhaust duct. The bottom of this hopper slopes toward the exhaust outlet, and this—when necessary—is flushed with oil to pick up the heavier particles and carry them to the settling tank.

The air-borne particles are collected in the multiwash unit which uses the same recirculated oil as the collection medium. Self-contained benches, supplied with complete collector units, are made in portable types for movement from one to another department in the rough grinding and finishing department.

H. S. Cover, South Bend, Ind., has developed a chemical cartridge respirator equipped with colored plastic to be worn by workers exposed to paint or lacquer sprays, chemical fumes, smoke.



Sly Dust Filter on roof of a foundry

THIS installation for a large jobbing foundry has a 14-foot filter divided into two sections: One section, 6′ long, exhausts a 10′ x 10′ blast room; the other section, 8′ long, exhausts tumbling mills and grinders.

These filters help make a cleaner plant, save maintenance costs, protect health and safety of employees. They provide definite and exclusive advantages:

1. Greater filtering capacity because of more filtering cloth
2. Taut bags (patented) save power and improve dust removal
3. Bags more easily replaced
4. Automatic control (any degree) minimizes or entirely removes the human factor
5. Simpler shaker mechanism results in savings in maintenance and operation

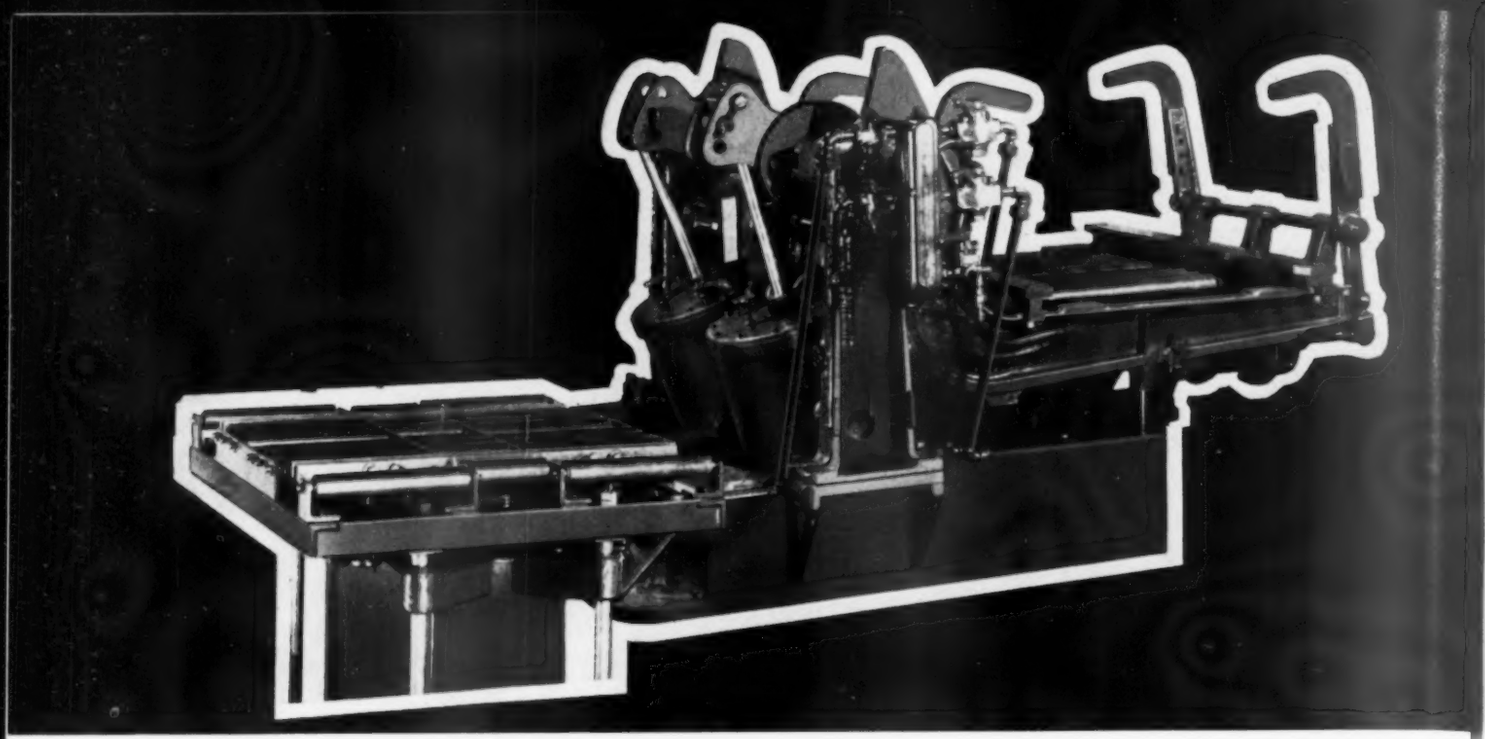
Sly Dust Control, with all its advantages, is not expensive. Tell us about your dust problem so that we may write you fully. Ask for Bulletin 98.

THE W. W. SLY MFG. CO.

4753 Train Avenue **Cleveland, Ohio**

TUMBLING MILLS **SLY** **BLAST CLEANING EQUIPMENT**

INDUSTRIAL DUST CONTROL



Type A Power Clamp, Power Turnover, Power Draw Machine for handling core boxes up to 55"x92" — 25" Draw. Designed for a HIGH PRODUCTION foundry making steel castings for WAR WEAPONS

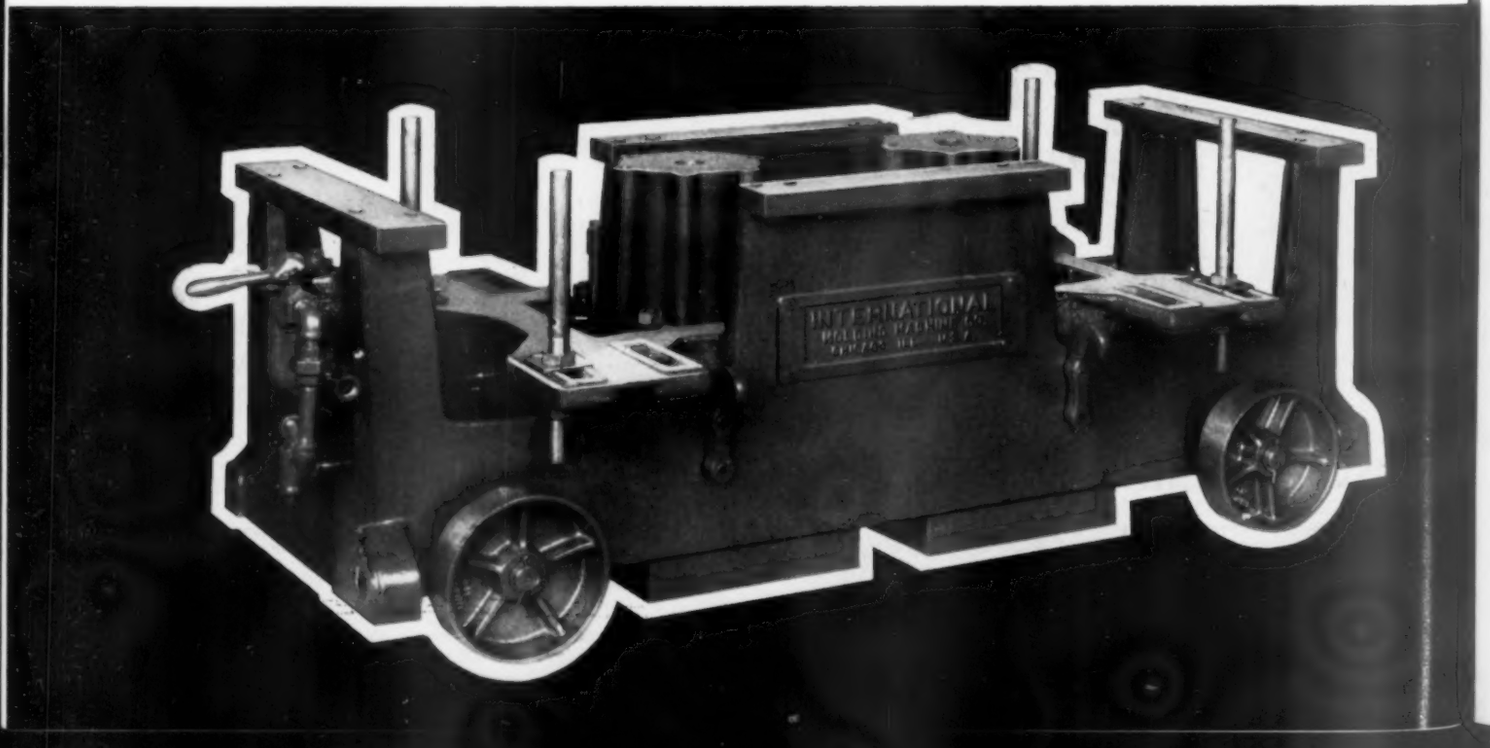
INTERNATIONAL MOLDING MACHINES

70 STANDARD TYPES — 900 DIFFERENT SIZES

Type LP Power Pin Lift Machine built for HIGH SPEED production of Aluminum Castings in flasks 30" x 90"

INTERNATIONAL MOLDING MACHINE CO.

2608 — 2624 WEST SIXTEENTH STREET, CHICAGO, ILLINOIS

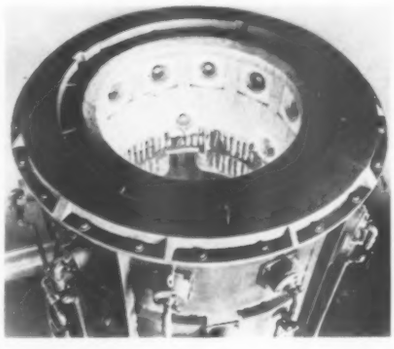


Hard Surfacing Alloy

For rebuilding worn surfaces on machine parts and other equipment, the Eutectic Welding Alloys Co., New York, has placed on the market a series of bare and coated welding rods for use on plain carbon and alloy steel, cast iron and malleable cast iron. The rod material is a ferrous base containing alloying agents such as nickel, molybdenum, etc., and can be used with the oxyacetylene torch or with arc welding. It is claimed that the rods provide a rapid and homogeneous flow, giving a strong bonding action free from blowholes. The welds are said to give high hardness resulting in favorable wearing properties, particularly against abrasion.

Magnesium Melting

To provide uniformity of heat delivery to the sides and bottoms of magnesium melting pots, the Selas Co., Philadelphia, has adapted the ceramic-cup radiant gas burner for firing furnaces designed especially for magnesium production. The accompanying illustration shows one which will take a 2000-pound capacity pot slightly over 3 feet in diameter and in depth. Eighteen cup gas burners are used arranged circumferentially with 12 in the top row, and 6 in the bottom



row. Gas and air premixed in correct ratio is delivered at 12 to 15 inches water gage manifold pressure, to each burner through an individual line and manual valve.

After the balancing valves are set, single valve 2-point control, actuated by a thermocouple in the molten metal, operates to control the mixture supply to all burners at once so that a pouring temperature of 1350 degrees Fahr. is maintained automatically. An auxiliary thermocouple in the combustion chamber is connected into the control system so that a predetermined maximum outside pot temperature cannot be exceeded. Design features are said to include split manifolding with each of 3 manifolds being protected against back-fire; 2 large opposed cleanout doors; emergency run-out spout; bottom venting; burner view holes for inspection of burner during operation; split cast iron top ring; 2-inch fire extinguisher openings around pot rim; hard burned refractory facing on floor and part way up sidewall to resist molten magnesium. Consumption of natural gas is claimed to be 750 cubic feet per hour; manufactured gas 1400 cubic feet, and producer gas 5000 cubic feet per hour.

Extinguisher Maintenance

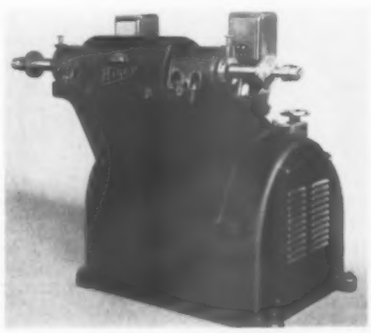
Pyrene Manufacturing Co., 560 Belmont Avenue, Newark, N. J., is distributing a folder containing directions for inspecting, recharging and maintaining portable fire extinguishers. Illustrations and text cover the 2½ gallon soda-acid type, 2½ gallon foam type, 2½ gallon water type with gas cartridge, the 2½ gallon anti-freeze type and the 2½ and 5 gallon antifreeze pump type. The text directs attention to the fact that the maintenance of fire extinguishers credited with stopping 70 per cent of all fires, is especially important when war time production, critical materials, plants and man power are at stake. Many places will be unable to get new extinguishers for the duration and therefore must keep present equipment in good operating condition. Fortunately, recharging materials are still available.

Plastic Paint

Calumet Plastic Co., 4732 Calumet avenue, Hammond, Ind., recently has introduced a liquid plastic paint for coating interiors, exteriors, concrete floors, etc. It is claimed that this paint expands and contracts with changing temperature and that cracks, splits and joints of reasonable size remain sealed. The painted surface is said to be nonporous and impervious to penetration of dirt and moisture.

Polisher and Buffer

Hisey-Wolf Machine Co., Cincinnati, has developed a new heavy duty polisher and buffer in which the motor, mounted inside the base, permits the use of standard open motors in place of totally enclosed motors and a corresponding saving in scarce materials. The machine is built in the single spindle, single motor type as well as the two spindle, two motor type, shown in the accompanying illustration, with motors 3 to 10 horsepower capacity. Oil lubrication with minimum attention is a feature of the constant level type oilers. While the illustration shows open type spindles, encased type can be furnished with a housing around the spindle extension and with a ball bearing adjacent to the wheel.



Pattern Coating

McDougall-Butler Co., Buffalo, has introduced a new protective coating for wood patterns. It is pointed out that this coating has the characteristics of shellac in that it brushes easily, dries quickly, can be sandpapered smooth and is economical. The coating can be obtained in clear, yellow, red and black colors, prepared for use. This corresponds to the different colors used to identify pattern parts.

Grinding Wheel

Sterling Grinding Wheel Division, Tiffin, O., recently has developed a new grinding wheel for use with tungsten carbide and similar alloys, drill points, and all kinds of steel. No steel or rubber is used in the wheels and the flexibility and lightweight of the new material from which the backplate is constructed is said to have advantages which

lengthen wheel life and improve cutting action. Since the wheels are lighter than the usual weight, they are claimed to be easy on bearings.

Furnace Control

An electric arc furnace control has been designed by the Allis-Chalmers Mfg. Co., Milwaukee, to increase wartime efficiency of electric furnace steel production in steel plants and foundries.

For the new furnace electrode control the company has applied an exciter of its manufacture, already in use by many companies for accurate, sensitive control on temper pass and reversing mills. Extreme accuracy is claimed for the new control as a result of quick reversing and smooth acceleration, while greater production is expected with the reduction of operating troubles and maintenance.

The exciter controls arc energy to a

constant quantity without the use of contact-making devices. Control field windings that measure arc current and volts are part of the fast-acting control element used in this method of electric arc furnace control. With its voltage controlled by the exciter, the small generator supplying power to the electrode motor causes the motor to raise or lower the electrode as required.

The variable voltage control eliminates high voltage inrushes which, with the elimination of contact maintenance, reduces production delays from these causes to a minimum.

Backstand Idler

Hammond Machinery Builders Inc., 1605 Douglas Avenue, Kalamazoo, Mich., has introduced abrasive belt backstand idler with a new spring loaded adjusting screw and hand wheel which maintains uniform tension on the belts and releases tension to make belt changes. This method converts existing grinding,

polishing and buffing equipment into high production machines, it is claimed. The machine shown in the accompanying illustration is a heavy duty type with ball bearing idler pulleys with simple adjustment for belt positioning and tracking. The machine can be used either right or left position by simply turning the idler wheel head and column 180 degrees where it is locked in position. The device can be used on the Hammond cylindrical finishing machine on a wide variety of work covering a range in size from ¼ to 9 inches diameter, straight or shoulder work. Also it can handle special types of work by the use of fixtures.

Sand Reclaiming

Whiting Corp., Harvey, Ill., has developed a wet cleaning system for reclamation of foundry sand. Heap sand is placed in an elevated hopper with a feed gate, and as it emerges from the gate it is washed down with oscillating hydraulic jets on to a double deck vibrating screen. Oversize material, gaggers, chills, etc., separated by the screens are discharged on a belt conveyor traveling over a magnetic pulley. The screened sand falls into a hopper from which it is pumped into a rake type, sand classifier for removal of clay, binder, silt and fines.

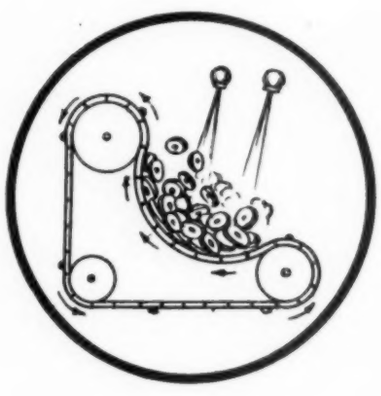
From the classifier the cleaned sand is raked into another hopper, and then pumped to an elevated settling tank. The sand is fed with a small amount of water on to a combined filter drum and dryer supplied with heated air. The dried sand, now containing from 1½ to 2 per cent moisture, is scraped from the drum, and falls on to a screw conveyor. From that the sand discharges into a double ribbon tempering conveyor which carries it to the boot of a sand elevator. The elevator lifts the sand to a conveyor belt which discharges into a storage hopper.

Skid Platform

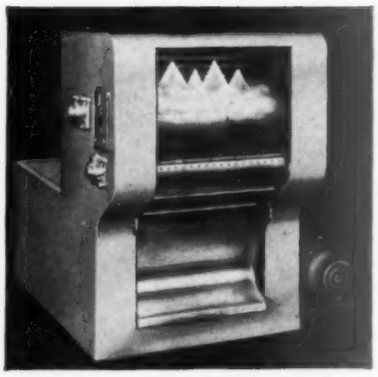
Union Metal Mfg. Co., Canton, O., has developed a new type material handling unit an open end inverted skid, for movement and storage of long bars or odd shaped parts. The unit is an all steel skid platform turned upside down and equipped with eyed brackets for the insertion of crane hooks. Designed for speedy handling of all kinds of materials, steel skids, boxes and pallets are available in sizes and types to meet all requirements. Corrugated design provides added strength and durability and they can be handled with crane, hand pallet or power fork truck.

Washing Machine

American Foundry Equipment Co., Mishawaka, Ind., has designed a new small metal parts washing machine which employs an endless tumbling belt. It is a batch type machine which receives and



discharges the parts to be cleaned through a large front opening. As the work is tumbled all surfaces are exposed to the powerful cleaning action of the sprays. Where the parts are handled in batch form, parts can be washed only, or the wash can be followed by a fresh water rinse with the rinse water draining to a sewer to prevent contamination of the washing solution. As shown in the accompanying illustrations, the open type barrel gives complete access to the parts while in process, and spray system also



is readily accessible for cleaning and inspection of pipe and nozzles. To unload the machine, the mill is run in reverse which discharges the parts over a chute. The unit is available for heating with steam, gas or electricity, and can be supplied with full automatic controls.

Lift Truck Hopper

Towmotor Corp., 1226 East 152nd Street, Cleveland, has developed a hopper attachment for its lift truck. The unit was designed for use with standard fork truck equipment and the hopper is available in various sizes. The company claims the hopper provides a firm carrying position and permits rapid tilting in dumping hopper loads. The attachment is carried directly on the fork support bar of the lift truck by means of a hook arrangement which is part of the hopper. Forks of the truck in a lowered position allow ample clearance beneath hopper without removal of the forks. Hopper gate is opened for discharge by pulling down a hand lever positioned within reach of the operator. The gate is closed by gravity and secured by an automatic-catch latch. The unit is for handling small parts and bulk materials chuted from storage bins or discharged from production machines. The hopper as an independent unit can be placed for filling while the lift truck is on the other jobs, the filled hopper to be picked up later and taken to its destination.

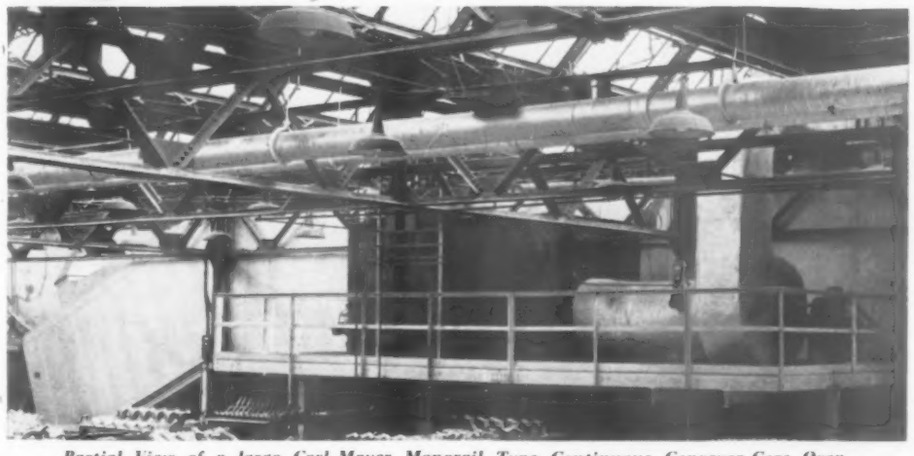
Stud Welder

National Cylinder Gas Co., 205 West Wacker Drive, Chicago, has introduced new stud welding equipment applicable for end welding of steel sections to metal surfaces. It is claimed the gun is simple to operate and does not require skill and long training. The gun combines arc welding with impact or forge welding. Duration of the arc is controlled automatically by an electric timer. At the exact instant the molten crater has been formed, the gun plunges the stud into place. The operator simply cocks the gun, places it in position and presses the pistol grip trigger. Automatic action permits the welding current to enter the gun only at the precise instant of welding. At all other times the gun is dead with no danger of accidental arcs.

POWER to destroy depends on your power to produce!

Speed War Production!

BAKE CORES BETTER, FASTER with CARL-MAYER Ovens



Partial View of a large Carl-Mayer Monorail Type Continuous Conveyor Core Oven. THREE installations similar to this are being built for the Ford Motor airplane engine plant

•

We also build high speed, efficient and economical Vertical Continuous Core Ovens

Carl - Mayer Creative Engineering has brought forth a series of developments in core baking and mold drying that is achieving amazing results in meeting today's crucial production demands of America's leading foundries.

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Over 20 Years' Experience

All Types **CARL-MAYER CORE AND MOLD OVENS** *All Sizes*

SERVING CONCERNS LIKE *these:*

Aluminum Co. of America
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Ford Motor Co.
Fox Furnace Co.
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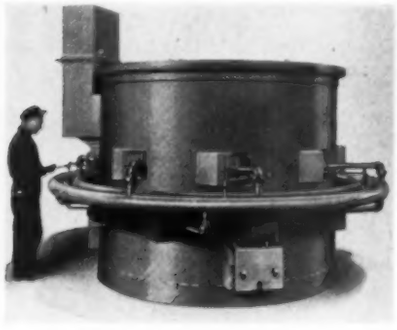
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
General Electric Co.
Gilbert & Barker Co.
International Heater Co.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.

Reflector

Westinghouse Electric & Mfg. Co., Electric Lighting Division, Edgewater Park, Cleveland, has introduced a new porcelain enameled high bay reflector for general lighting medium and low bay areas in industrial plant. The new line is designed for either incandescent or high intensity mercury lamps and is available with either the locklite two piece, quick detachable construction or one piece type for conduit or outlet box mounting. The multiple coat porcelain enameled reflecting surface is permanent, easily cleaned and has a reflectivity of 80 per cent.

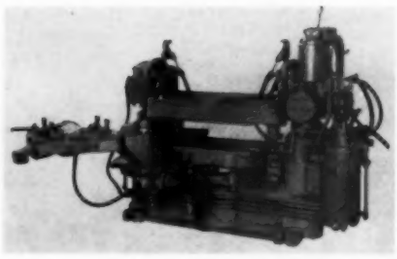
Holding Furnace

Fisher Furnace Co., 5535 North Wolcott Avenue, Chicago, has designed a stationary furnace for melting, holding or alloying magnesium. The furnace, which is shown in the accompanying illustration, has a capacity from 2000 to 4000 pounds. Maximum temperature uniformity is said to be provided by a staggered, duo-bank arrangement of multiple, low capacity burners. Half of the upper and half of the lower banks of burners are operated by each of two proportional mixers which maintain controlled proportional atmosphere through full turn-down range of 5 to 1 with all burners operating and ultimate 10 to 1 turndown with only half of the total number of burners. It is claimed that the staggered burner arrangement permits use of low capacity burners and prevents localization of heat in the combustion chamber and undue scaling of the steel pots. Each burner is serviced by a gas pilot and the gas supplied to the pilot burners is controlled through an independent proportional mixer. The units may be fired by gas or oil.



Molding Machine

Osborn Mfg. Co., 5401 Hamilton Avenue, Cleveland, recently developed a special type molding machine for the production of aluminum cylinder heads for radial type aircraft engines. The machine shown in the accompanying illustration eliminates practically all manual labor and therefore where necessary or expedient may be operated by female labor. A special mechanism performs the rollover operation with practically no exertion on the part of the operator. The power rollover mechanism is built around a double acting hydraulic piston using air or oil as a source of power and providing an oil cushion at both ends of the stroke. It is claimed the mold is rolled over with a smooth, positive motion from which all starting or stopping shock has been eliminated. The operator opens an air valve and then gives the rollover table a slight manual start. The manual start has been retained as a safety factor and only requires slight effort on the part of the woman operator.



Marking Tool

Jas. H. Matthews & Co., 3942 Forbes Street, Pittsburgh, has made a new addition to its line of interchangeable steel type holders. The new holder can be used with a hammer or easily may be converted for use in a press. For hand use the removable head is placed over the shank and held in place with a set screw. For press use the head is removed and the shank is placed in the press. The holder can be made to fit any desired size cavity. The ½-inch character size is recommended for all soft materials. For medium duty up to ⅜-inch character size is used. Up to 3/16-inch size characters are recommended for deep marking on high alloy steel. Steel type quickly and easily is changed by applying slight pressure on a spiral spring. Type is available in letters, figures, symbols or logotype in the following sizes: 1/16, 3/32, 1/8, 5/32, 3/16, 1/4, 5/16, 3/8, and 1/2-inch.

Car Spotter

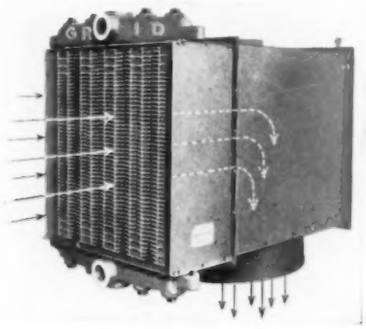
Link-Belt Co., 307 North Michigan Avenue, Chicago, has added a portable type to its line of motorized, electric car spotter. As shown in the accompanying illustration, the spotter is balanced on a channel iron frame so that one man can lift the end and roll the unit to any desired location. The operator needs only to anchor the frame with a chain, as illustrated, plug the electric cord into the nearest power outlet, hook one end of the haulage cable to a car or object to be moved, wrap the other end around the capstan, turn on the motor and feed away the cable. The machine does the actual pulling.

Marking Device

Acromark Co., 9-13 Morrell Street, Elizabeth, N. J., has produced a new marking unit for shells, shot, tags, tubes, drills, bushings and other items of copper, brass or unhardened steel. The unit puts identification number, code stamp or other marking into four lines of type or equivalent, in one-eighth inch letters and die cuts the marking on the product.

Unit Heater

D. J. Murray Mfg. Co., Wausau, Wis., has developed a new unit on the down blow principle added to the construction of a unit heater in which the heating sections are high test cast iron. Arrows on the accompanying illustration indicate the flow of air into, through and out of the unit. Special features include protection of the motor from radiant heat. Electrolysis cannot be developed to cause corrosion. Each fin heating section is high test cast iron in one piece and only one type metal comes into contact with steam or hot water.

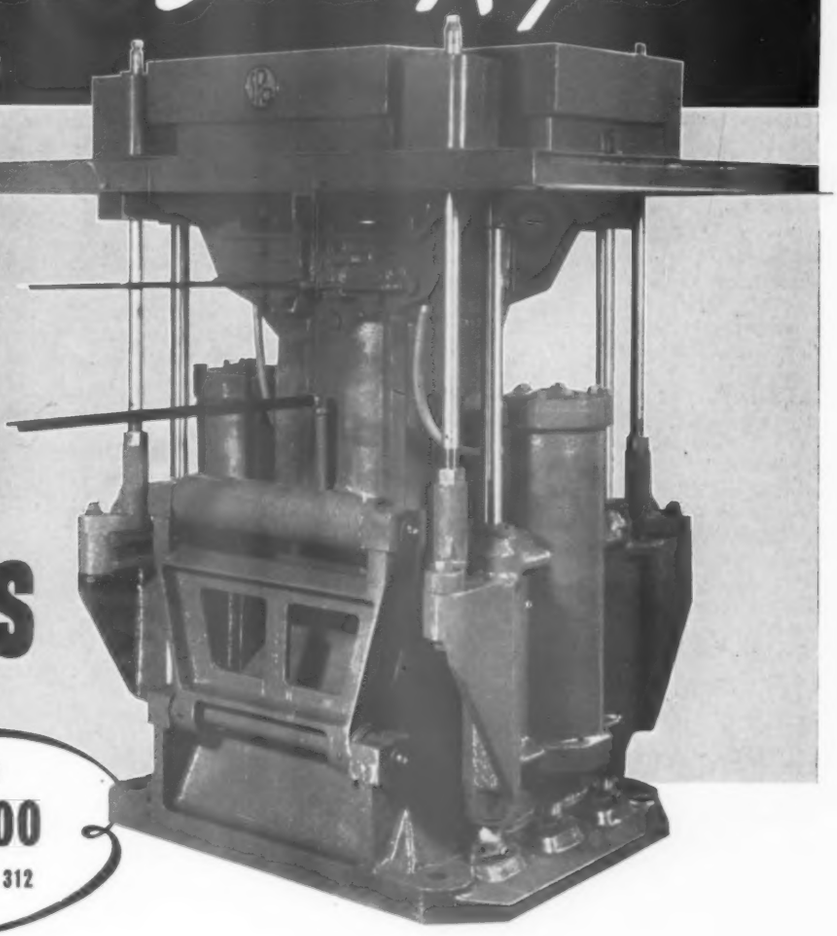


Transfer Car

Whiting Corp., Harvey, Ill., recently has built and installed what is claimed to be a remarkably efficient transfer car for moving annealing oven cars in a prominent Midwest foundry. A second car is under construction and others are being designed. An ingeniously designed mechanism may be raised to engage a rack attached to the bottom of the annealing oven car. Safely within an insulated steel and pyrex glass cab, the operator, by pushing a lever, can withdraw the hot car from the oven. In addition to three electrical limit switches which make accidental operation impossible, the car is protected with a variety of safety devices. All operating parts are readily available for maintenance. One powerful motor operates the racking mechanism. A second motor insures smooth, economical transverse motion.

Do it Fast.. Do it Right

WITH SPO MOLDING MACHINES



THE SPO
NO. 300
SERIES-No. 312

This husky SPO No. 312 Jolt Stripper has a 4000-pound capacity. It gives you 26" of smooth, accurate draw. The machine table sets slightly above floor level, making the flask height just right for convenient handling of sand. Adjustable lifting pins enable you to handle a wide range of flask sizes and shapes. The floor plate is constructed to keep the sand from accumulating around the working mechanism.

Other features. Plenty of speed; powerful jolt blow for packing deep molds—ideal for steel foundries; minimum parts and maintenance; compact, saving floor space; adjustable jolt exhaust valve controls intensity of stroke and impact blow for any load. Perfect alignment of stripping mechanism insured by squaring shaft and hardened and ground bushings in stripping yokes, which operate on hardened and ground guides.

Have you a special problem? Look to the SPO engineering staff for *profitable* counsel. We will recommend the *one right machine* for your purpose.

SPO builds both molding machines and pattern equipment and guarantees every job to be in full accordance with your specifications.

SPO INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

CLEANING CASTINGS WITH

Water and Sand

ECONOMY in operating cost and what is of equal under present peak production conditions, ability to handle increased loads in a given period of time, are claimed by a prominent Midwest nonferrous foundry through the installation of a hydroblast tumbling barrel made by the Whiting Corp., Harvey Ill. Advantages of the new method extend beyond the cleaning room in the foundry. In the machine shop it is claimed that exceptionally clean skin on the castings has facilitated operations and has increased the tool life to a highly gratifying extent.

Approximately 90 per cent of the castings are cored or solid cylindrical sticks, and bushings ranging in size from 1 to 12 inches in diameter, in lengths about the same. The walls vary in thickness and the metal compositions embrace practically every mixture employed in industry for bearing purpose. Finish allowance in all castings is held to a minimum. Large bushings are bored and turned. Small bushings are turned in the lathe, but the inside is finished by broaching in which only a thin layer of metal is removed. Obviously a few grains of sand or a little scale imbedded in the skin of the casting would injure the tool and cause rejection of the casting

Use Open Flame Furnaces

Metal is melted in a battery of six open flame furnaces fired with oil and set up in a room partitioned off from the remainder of the foundry. Capacity of each furnace is 1000 pounds per heat. Molten metal is conveyed to the various molding floors in the ordinary type steel ladle lined with clay and preheated before the first filling. The ladles are suspended from a monorail system with suitable switches by which any ladle may be spotted under any furnace and later directed to any given floor of molds.

Molds are made on machines and then placed on long racks elevated about 12 inches above the floor for convenience in pouring. The molds are stacked two deep and tilted at an angle of about 20 degrees, with the sprue at the high end. The smaller patterns are arranged in a double row with a long runner in the center and a single small gate leading to each. The molds are green sand, but the cores are dried. Many of the smaller cores are made on a pair of core blowing machines. These cores are made from a mixture of all new sand bonded with oil. Other cores are made on a number of benches from coreboxes designed to form a complete core that is truly round. They are rolled out on plates and dried in a drawer or shelf type oven. These cores are made from a mixture of old molding sand and new sharp sand, approximately two parts old sand and 1 part new sand, bonded with a cereal binder. They are vented through the center and the majority are placed in the molds in the natural state. Cores designed for high phosphorus and other searching metals, are coated with graphite.

Shortly after the castings have solidified in the molds they are shaken out. The sand is sprinkled with water and shoveled into a pile close to the molding station. An attendant armed with a steel bar hooked at one end picks up each gate of castings in turn and submerges it in one of several water tanks set up at convenient points on the floor. Generation of steam produces an explosion which violently blows the cores out of the castings. Constant stream of water flowing into the tank at one side and out the opposite side keeps the temperature down. At periodic intervals the sand is removed from the bottom of the tank.

Castings Cleaned in Barrel

Castings are loaded in wheelbarrows and taken into an adjoining room where they are cut away from the gates in a power operated sprue cutter. Gates and sprues are tossed back into the wheelbarrow and taken to the stock bins near the furnace room and later incorporated in the charges for the various furnaces.

From 250 to 300 pounds of castings are taken 10 or 12 feet by wheelbarrow and loaded into the hydroblast tumbling barrel where they are subjected to the tumbling action and to a high pressure stream of sand and water for approximately 10 minutes. Then they are removed to a distributing station and the cycle repeated. The steel drum or barrel is supported on trunnions and can be swung to any position from the perpendicular to any convenient point below the horizontal for loading and unloading. Movement and locking position are controlled by a push button at one side and by a long lever at the opposite side. Several helical projections on the interior face of the barrel supplement the rotary motion to stir up the castings and thoroughly expose all parts of the surfaces to the action of the sand and water. Spent sand and water flow through perforations in the bottom of the barrel, and through a screen into a concrete pit. Coarse material is retained on the screen.

Opening from the receiver to the fines pit is designed so that flow of the mixture will carry the fines along. Positive separation of the fines is obtained by introducing a long lip baffle plate at the left of the fines pit. This slows down the flow so that the fines will settle. Overflow water goes to the sewer.

After the barrel cover is closed and clamped the barrel is turned to an angle of approximately 45 degrees from the horizontal position in which it was loaded. A push button starts the barrel rotating slowly or just enough to keep the castings in motion. Valves are opened on the water hose and the sand hose. The nozzles are close together and project inside through a small opening in the barrel cover which remains stationary and does not revolve with the barrel. Sand from a pit under the machine is induced by a 28 inch vacuum to mingle with the stream of water leaving the hydroblast gun at a pressure of 1200 pounds per square inch and a speed of 18,000 feet per minute. The pump handles only clean water.

After a period of 10 minutes determined by a clock on the wall, the sand hose valve is closed and the stream of water rinses the castings clean.

Casting Properties Improved by Aging

By JOHN HUBEL

It is well known that a number of aluminum alloys gain in tensile strength and hardness after aging at room temperature for some time; due to structural changes involving the precipitation of certain metallic compounds. However, that same change can be produced much more rapidly by heating the alloy at moderate temperatures for varying lengths of time, and the process is called artificial aging or precipitation heat treat-

(*Concluded on page* 158)

Heat treating and aging of aluminum alloy castings is accomplished in a gas-fired, recirculating type furnace. The combustion unit is mounted on top of the furnace

SAFETY GRINDING WHEELS

AND SWING FRAME GRINDERS MAKE GOOD TEAMMATES FOR FASTER, SAFER SNAGGING

SAFETY GRINDING WHEELS and SAFETY DE LUXE SWING FRAME GRINDERS are teaming together in war factories, foundries and shops all over the country, speeding up production, doing a faster, safer job of snagging. For example: We helped one of the nation's largest manufacturers of airplane propellers increase production and simplify operations by means of the SAFETY Swing Frame Grinder. Let a SAFETY Sales Engineer — a man experienced in grinding production problems—show you how SAFETY Grinding Wheels teamed with SAFETY Swing Frame Grinders or SAFETY Floor Stand grinding equipment can help you speed up your production. There's no obligation. We can assure prompt delivery on wheels and equipment.

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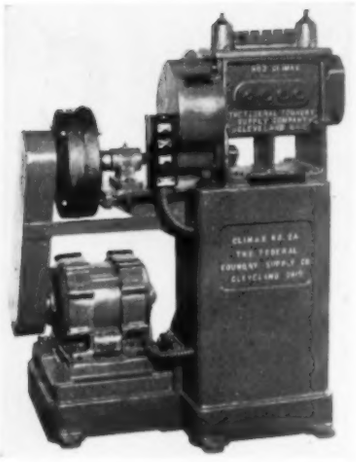

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TWISTED STEM CHAPLETS—Everything you want in a chaplet. The smooth twisted square stem will not collect dust or moisture—offers no place to trap gas. Guarantees perfect fusion from head to head. Four sharp fusion edges the entire stem length. Stronger, size for size, than any other type of stem. Ample strength guarantees perfect core support.

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CLIMAX WIRE STRAIGHTENER—Salvage *used core wires* and rods for *re-use*, with the aid of a Climax Wire Straightener. The Climax Wire Straightener is made in 3 sizes and 9 models, each of which will straighten several different sizes of rods. Our new circular and price list is yours for the asking. Why not write for it today?

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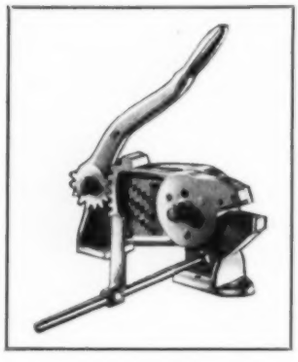

A BIG TIME SAVER!

THE WONDER CUTTER—Cuts core wires, rods and small band iron, easily and quickly. Capacity in square rods, 3/8"; round rods 5/8" and band iron up to 1/8" x 2". Adjustable gauge permits repeated cuts to same length when needed. Small compact size makes it easy to mount wherever convenient. You'll find many uses for the Wonder Cutter.

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THE LOWE ELECTRIC SIFTER—Faster sifting, longer wearing. A new-design malleable yoke adds new "zip" to the patented Lowe sifting action. More room above the screen permits faster loading. 21-inch diameter removable screen bottoms—readily interchanged for different types of work. Totally enclosed ball bearing motor gives long low-cost service. Lowe-sifted sand is better sand.

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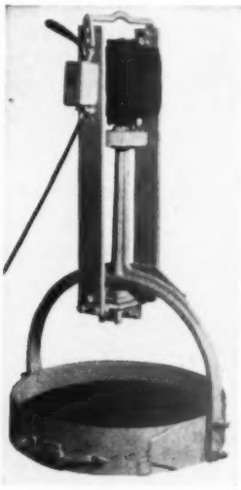


THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

CHICAGO — CHATTANOOGA, TENN. — DETROIT — MILWAUKEE — MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

FOUNDRY COMMENT

BOTH gray iron foundrymen and producers of aluminum and magnesium castings should find much of interest in this discussion on the value of mass which appeared originally on the editorial page of the Dec. 3, 1942 issue of the *Foundry Trade Journal*, published in London.

The Value of Mass

In the minds of those charged with the propaganda for the various industries there seems to be little conception as to the value of mass. Where plastics and light alloys are concerned, the propagandists have taken the myopic view that for every application the lighter its ultimate weight, the better the appeal it makes to the engineer and general public. Actually, for many jobs, weight is essential for efficiency. The plastics industry has announced its intention of manufacturing sewing machines, and so, we are told. no longer will it be necessary for father to carry it from the corner of the spare room to the dining room table! Yet the utility of such a machine for the hemming of heavy curtains is questionable. Even light-weight typewriters have a habit of wandering. Of more importance is the reduction of weight in machine tools, for here again, going beyond an as yet undefined limit, rigidity is sacrificed. Ironfounders have themselves been inadvertently a little responsible for this craze for lightness, for in recent years they have been asking for evenness of section and a reduction in overall weight as they were in a position to supply a stronger material. It appears to us that, while the designer is furnished with the mechanical properties of the materials he incorporates in his machines, as yet he possesses no data to the requisite mass necessary to assure rigidity in operation. To revert to the sewing machine, a reliable figure of the rigidity required could be obtained by ascertaining the weight of the heaviest fabric, and doubling it, as the pull on the machine is dynamic. The designers having established the essential weight, might conserve mass and increase portability by making the machine in two parts, the base to be cast iron instead of wood. which incidentally would give increased rigidity, and the upper part mainly in light alloys. Propaganda has been put out by the aluminum interests for cooking stoves to be made in light alloys. Here, again, we feel that the advantages of portability have been overstressed. The cooker will obviously always be housed in the same situation, and the sole advantage of increased portability is the facility it may present for cleaning between the wall and the stove. This applies primarily to electrically heated apparatus, but gas cookers could also be supplied with a flexible pipe connection for this purpose. So far we have heard of no propaganda directed towards the capturing of the lawn-mower trade. The later types carry a different design from the earlier models, as they are apparently self-balancing and only require pushing, but they are down to a minimum weight consonant with efficiency. Propaganda based on lightness would be analogous to trying to sell garden rollers on the same untenable principle.

There are many articles normally made in cast iron or wood which have for years been fabricated in light alloys, purely because of weight considerations as related to the mass of the whole structure. Typical of this activity is the furnishing of submarines, and the aluminum founders would do well to examine their general performance as a basis for civilian exploitation. Generally speaking, the aluminum propagandists have been looking too assiduously at the cast iron field as being the most promising for cultivation, and too little thought —judging by what has been published— to the competition they will undoubtedly have to meet from plastics. Here "light weight" as a selling point does not exist, and an armoury of alloys equipped with better mechanical properties and or more pleasing aspect will have to be developed.

—o—

According to the Department of Commerce, production of malleable iron castings in December was 66,177 tons compared with 59,287 tons in November and 71,311 tons in December 1941. The total production of malleable iron castings for 1942 was 768,496 tons as compared with 843,038 tons in 1941 and 565,923 tons in 1940. It is interesting to note that orders jumped from 74,080 tons in November 1942 to 93,824 tons in December.

—o—

About a year ago THE FOUNDRY studied carefully all of the available statistics on the gray iron foundry industry, considered those factors which affect production, estimated a bit here and there, and came up with the report that that industry, in the United States and Canada, produced 12,591,740 tons of castings. It would seem that our calculators were a bit short. W. W. Rose, executive vice president of the Gray Iron Founders' Society, reports that in 1942 the gray iron industry of the United States alone *produced* 14,500,000 tons of castings at a total value of approximately $1,740,000,000. These figures indicate the tremendous service which the gray iron industry is rendering the American war effort.

—o—

Castings gradually are winning more popular acclaim. The other night Earl Godwin told about replacing forgings with steel castings. Undoubtedly every type of cast product has a most interesting story on developments brought about by war demands.

—o—

Enough can be too much. Read what one of our subscribers recently wrote: "We have given up the battle of filling out WPB forms and no longer run our foundry. Instead everyone is busy with the machine shop where reports aren't quite so bad. If they get much worse we will close the machine shop too and all start filling out reports to win the war."

—o—

A recent news release from the WPB division of information, dealing with production in Detroit, carries the following statement. "Huge travelling cranes pick up 3-ton turrets for 30-ton tanks— steel castings that weigh and cost twice as much as a finished automobile. Cutting operations on these turrets take off about 380 pounds in chips. On the floor of the plant can be seen tanks in all stages of completion."

—o—

Through the kindness of numerous amateur photographers in various sections of the country, THE FOUNDRY, for several years, has been privileged to present a large number of photographs taken in connection with chapter meetings, outings, Christmas parties and other foundry gatherings. The editors have enjoyed meeting foundrymen from all parts of the country through the medium of these pictures, and we feel that our readers also have been interested in watching for their friends. Now the war requires the same metals that we use for making engravings and for that reason the WPB has reduced the amount of zinc used for the production of halftone illustrations. Because sufficient metal is not available, it has been necessary to discontinue the foundry group pictures for the duration, or at least until the supply of metal is sufficient for us to have both ammunition and engravings.

F. G. S.

FOUNDRY ACTIVITIES

SEALED POWER CORP., Muskegon, Mich., has received an increase in its contract with the Defense Plant Corp. to provide additional facilities for a plant in Michigan.

° ° °

Milwaukee Valve Co., Milwaukee, has begun expansion of its plant.

° ° °

Kirsh Foundry Inc., Beaver Dam, Wis., plans to remodel its foundry.

° ° °

Rolle Casting Co., 2816 Bridge street, Philadelphia, plans foundry.

° ° °

Standard Alloy Co., 1679 Collamer Road, Cleveland, is building an addition to its foundry.

° ° °

William Kennedy & Sons Ltd., Owen Sound, Ont., has let contract for a plant addition.

° ° °

Kay Brunner Steel Products Inc., 999 Meridian Avenue, Alhambra, Calif., is building an addition to its plant.

° ° °

Columbia Steel Castings Co., Portland, Oreg., is building additional plant facilities as a Defense Plant Corp. project.

° ° °

Aluminum Co. of America, 2210 Harvard avenue, Cleveland, has plans for a pattern shop and storage building.

° ° °

Cleveland Graphite Bronze Co., Cleveland, is building a $75,000 addition to its castings cleaning building.

° ° °

Index of new equipment orders for December, 1942, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 319.8 as compared with 286.1 in November. Index for repairs was 571.3. Index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

° ° °

Atlantic Foundry Co., 182 North Beaver street, Akron, O., is building an addition to its foundry.

Kelsey-Hayes Wheel Co., 3600 Military Street, Detroit, has let contract for a plant addition.

° ° °

J. I. Case Co., Racine, Wis., has let contract to Austin Co., Chicago, for alterations to its Rock Island, Ill. factory buildings.

° ° °

Pacific Steel Casting Co., 1316 Second Street, Berkeley, Calif., has awarded contract for remodeling its foundry and office building.

° ° °

Diamond Iron Works Inc., Minneapolis, has been authorized by Defense Plant Corp. to undertake an expansion program.

° ° °

Advance Aluminum Castings Corp., 2742 West Thirty-sixth Place, Chicago has completed additions to plant capacity.

° ° °

Canadian Summer Iron Works Ltd., 2550 Central Arterial highway, Vancouver, B. C., has plans for a plant addition.

° ° °

McKinnon Industries Ltd., St. Catharines, Ont., has plans for plant addition and installation of electric furnace equipment to cost about $25,000.

° ° °

Keystone Brass Works, Erie, Pa., plans an addition for storage to free space in factory for production. Additional machinery will be install d in space vacated.

° ° °

Medina Iron & Brass Co., Medina, N. Y., soil pipe manufacturer, has closed for the duration due to inability to secure materials and men. The plant, organized nearly 50 years ago, has been active up to this time.

° ° °

Bertoldi Kelter Co. Inc., Thirteenth and Adams Streets, Hoboken, N. J., has let contract for a one-story foundry to Jacob Kaskam.

° ° °

Cooper Alloy Foundry Co., Hillside, N. J., has contracted with the Defense plant Corp. to provide additional equipment for a plant in New Jersey which the foundry company is operating.

National-Erie Corp., 1521 Raspberry street, Erie, Pa., is planning construction of a factory building. Ostergaard Inc., Erie, general contractor, Meyers & Johnson, Erie, architects.

° ° °

Plant of the Electrocast Steel Foundry Co., Cicero, Ill., was damaged recently when an explosion occured when molten metal which was poured from an electric furnace into a ladle, struck water in the ladle pit.

° ° °

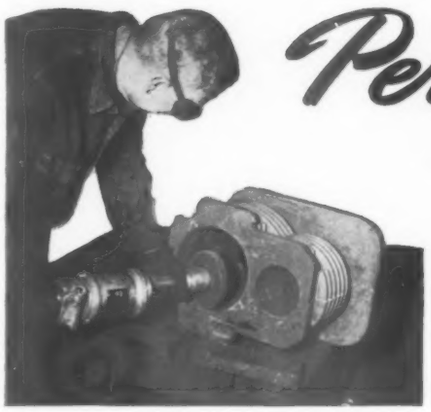
Aluminum Foundry Division, Williard Storage Battery Co., located in the Southwest now is in production on heat-treated aluminum castings for aircraft. The foundry is equipped with jolt-squeeze molding machine made by the Osborn Mfg. Co., Cleveland; core ovens made by the Foundry Equipment Co., Cleveland; and conditioners made by Royer Foundry & Machine Co., Kingston, Pa.; aging furnaces made by the J. C. Smith Co.; heat treating furnaces Chicago, and x-ray inspection equipment made by Lindberg Engineering Co., made by the General Electric Co., Schenectady, N. Y.

Valve Company Wins Army-Navy Burgee

Crane Co., Chicago, was awarded the Army-Navy "E" for excellence in production of valves and fittings for the war program at ceremonies held Jan. 29. Rear Admiral Clark H. Woodward, U.S.N.R., Washington, and originator of the award to industrial plants, presented the pennant to J. H. Collier, president of the company. Col. J. F. Butler, chief, Army personnel branch, sixth service command, awarded "E" lapel emblems to the company's 15,000 employes.

Publishes Standards

American Society for Testing Materials has published a 160-page book containing 23 specifications and tests on electrical heating and resistance alloys developed by its Committee B-4. In addition the book contains 4 technical papers on thermostat metal, methods of testing thermocouples and thermocouple materials, electrical surge tests on contact materials, and contact testing machines. Copies of the book may be obtained for $1.50 from headquarters of the society 260 South Broad street, Philadelphia.



Periodic Lubrication,

SIMPLE MAINTENANCE, KEEP CP HICYCLE GRINDERS IN CONTINUOUS SERVICE

Cool-running, Long-service Tools assured by Four Precautions

CP Hicycle Electric Grinders have long been known for their low maintenance costs — lowest of any type of portable tool. But, even CP Hicycles will give better service, with minimum of repair time if they are given ordinary care.

Here are four simple suggestions which will help you keep Hicycle Grinders in continuous service. Do these things regularly and you will cut repair time to the minimum and conserve strategic materials.

While these illustrations show a CP grinder, the suggestions are applicable to most CP Hicycle Electric Tools. Detailed recommendations on other CP Hicycle and Universal Electric Tools will be given in future advertisements. Watch for them.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP HICYCLE GRINDERS

1 Clean out gear case once a month and fill with grease two-thirds full. Too much will cause churning action and get into motor.

2 Keep the ventilation openings free of dirt. Once a month — more frequently under dusty conditions — blow out openings with air hose.

3 A hot tool indicates overloading, too much grease or too little grease. Check temperature of housing by touching it frequently.

4 A good precaution with all electric tools. Always keep rubber cables free of grease and oil, otherwise they will swell and rot.

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PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
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AVIATION ACCESSORIES

Obituary

JOB GOOSTRAY, retired general foundry foreman, Hunt-Spiller Mfg. Corp., Boston, died at his home in Watertown, Mass. on Feb. 2. Mr. Goostray was born Nov. 28, 1850 near Manchester, England. He began his foundry career at the age of 12 and worked at the same foundry for 8 years. At the age of 20 he left England to come to the United States, where he spent the following 10 years looking for a job to suit him. He first worked for the Locomotive Works, Manchester, N. H., and later was connected for varying periods of time with other foundries in Manchester and Concord. He joined the South Boston Iron Works, predecessor company of the Hunt-Spiller Corp. in 1880, and was appointed foundry foreman in 1892. Later he became general foundry foreman from which position he was retired from active duty in March, 1932 after 52 years of service.

° ° °

Benjamin Rathbun, president, Chemung Foundry Corp., Elmira, N. Y., died on Jan. 9.

° ° °

Chester L. Cunningham, 72, retired foreman of the Charleston Foundry Co., Charleston, W. Va., died recently in Charleston.

° ° °

William E. Robinson, 59, president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, died in Waterloo, Iowa recently.

° ° °

Alexander E. Martin, 75, founder, Central Foundry, Milwaukee, which later became the A. E. Martin Foundry Co., died Jan. 8.

° ° °

John C. Maher, 63, manager, Ohio Foundry Co., Cleveland, died Jan. 22, in Cleveland from injuries sustained in an automobile accident.

° ° °

Stanley Kitto, 48, treasurer, Belle City Malleable Iron Co., Racine, Wis., died Jan. 30 at his home in Racine. Mr. Kitto had been treasurer of the company since 1926.

° ° °

J. Willis Gardner, 79, chairman of the board, Gardner-Denver Co., Quincy, Ill., died in Quincy, Feb. 1, following a long illness. Mr. Gardner, a son of Robert W. Gardner, founder of the Gardner Governor Co. in 1852, worked his way up from a machinist's helper to president and owner of the company which merged with the Denver Rock Drill Co. in 1927 to become the Gardner-Denver Co.

° ° °

George A. T. Long, 85, in charge of the foundry service department, Pickands, Mather & Co., Chicago and associated with the company for the past 40 years, died in Chicago Feb. 15. In recognition of his prominent connection with the foundry industry, the American Foundrymen's Association conferred honorary life membership on Mr. Long at the Chicago convention, 1940. Among other distinctions it was claimed he was the only living foundryman who had attended every one of the association conventions, commencing in 1896. Mr. Long was born in Chicago in 1858 and at the age of 14 started to serve a foundry apprenticeship with the Union Brass & Iron Co. Later he worked in Detroit with the Hodge Iron Works, Michigan Malleable Iron Co., and the Semet-Solvay Co. In 1903 he returned to Chicago to enter the employ of Pickands, Brown & Co., subsequently Pickands, Mather & Co., in charge of the foundry service department. While connected with the Semet-Solvay Co., he pioneered the use of byproduct coke among foundrymen and he always claimed that he originated the use of pitch compound as a core binder.

George A. T. Long

° ° °

Harris T. Dunbar, vice president, David Bell Co., Buffalo died in Buffalo, Jan. 15. Mr. Dunbar was one of the founders of Buffalo Foundry & Machine Co.

° ° °

Richard F. Howe, 79, International Harvester Co., Chicago, from 1902 to 1911, died Jan. 26 at his winter home in Aiken, S. C. Mr. Howe entered business with the Simmons Co., Kenosha, Wis., and later became a partner of William, Charles and James Deering in the Deering Harvester Co. When the latter was merged with International Harvester Co., in 1902, he became secretary.

° ° °

Michael L. McGuire, 63, foundry consultant, George F. Pettinos Inc., Philadelphia, and George F. Pettinos (Canada) Ltd., Hamilton, Ont., died Jan. 18, at his home in Hillside, N. J. Mr. McGuire was born in White Haven, Pa. in 1880 and entered foundry work at the age of 12 in the Samuel Wallace Foundry at White Haven. He became foreman of the core shop at 17, and held that position for 6 years. Leaving there, he went to Elizabeth, N. J., to Moore Bros. Foundry where he was core room foreman for 5 years, and then went to the A. & F. Brown Foundry in Elizabeth, N. J., for 3 years, after which he spent 10 years as core room foreman at the Moore plant, Bethlehem Shipbuilding Division, Elizabeth. The following 10 years he spent with the Elizabeth Foundry Co., a subsidiary of the General Electric Co. He started as foreman of the core shop and later became general superintendent. He held that position until the shop was closed, and then was transferred to the Elmira, N. Y. foundry of that company. After a few years at Elmira, Mr. McGuire resigned to join the staff of George F. Pettinos Inc.

° ° °

Martin J. O'Brien Sr., 64, general manager, Bison Castings Inc., Buffalo, died Feb. 12, at his home in Lancaster, N. Y. Mr. O'Brien was born in Bonne Terre, Mo., starting in the steel industry as a boy. During his career he worked for American Steel Foundries, St. Louis; Scullin Steel Co., St. Louis; Symington-Gould Corp., Depew, N. Y.; and Canadian Steel Foundries, Montreal, Que. Mr. O'Brien reopened the Bingham & Taylor plant in July as Bison Castings Inc. He is survived by two sons, both in the foundry industry. Martin J. O'Brien Jr., assistant works manager and Kenneth

M. J. O'Brien Sr.

(*Concluded on page* 165)

DELIVERIES ARE TOUGH THESE DAYS BUT...

We're trying to lick them by confining our manufacture to the most popular sized hoists

We suggest, for the present, that if you have a materials handling problem, you write promptly or telegraph us for full information on a Lo-Hed Hoist to meet your needs.

WHAT "BALANCED CONSTRUCTION" MEANS TO YOU

The *balanced* arrangement of motor and drum in a Lo-Hed Hoist allows the hook to be pulled up until it almost touches the beam, giving you minimum headroom—a desirable plus feature for which you pay no premium. This same arrangement makes possible the use of an all spur gear drive from motor to drum.

FEATURES OF LO-HED HOISTS...

HEAVY DUTY HOIST MOTOR: Built especially for hoist service. Ball Bearing. Fully enclosed.

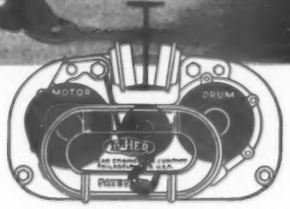
STRONG, SHORT SHAFTS: For strength. Bearing races pressed on ends of shafts to eliminate shaft wear.

HIGH DUTY BEARINGS: On gear shafts and trolley wheels. All main bearings operate in oil bath.

100% POSITIVE AUTOMATIC STOP: Shuts off current and applies holding brake automatically at upper limit of travel.

STRAIGHT LINE SPUR GEAR DRIVE: All spur gear for efficiency.

COVERS: Gearing sealed in oil bath. Controller, motor and drum protected by removable steel covers.



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activities of foundry groups

St. Louis

SECRETARY of the A.F.A., Robert E. Kennedy, was present at the Jan. 14 St. Louis Chapter meeting at DeSoto Hotel, to outline plans for the foundry war production congress to be held in St. Louis in April. He also commented on the growth of the American Foundrymen's Association during the past year and explained the purpose behind the cupola research bureau.

Chairman of the chapter, C. B. Shanley, Semi-Steel Casting Co., presided. He introduced several new members and visitors before introducing Edward H. King, general manager, Hill & Griffith Co., Cincinnati, O., who was the speaker for the evening. Mr. King discussed, "Choice and Application of Foundry Facings". In his talk he gave the history, usage and development of ten different types of foundry facings.—*J. H. Williamson, secretary-treasurer.*

Northern California

ANNUAL joint meeting of the Northern California Chapter of the A. F. A. and Golden Gate Chapter of the A. S. M. was held Jan. 26 at the Engineers Club, San Francisco. There were 80 in attendance for dinner plus a few who came in later. Chairman of the A. F. A. chapter, F. A. Mainzer, and John Birmingham, chairman of the A. S. M., divided the honor of welcoming members and guests, each calling on their program chairman for reports of meetings scheduled for the future. Time was taken for each present to introduce himself before the meeting was turned over to A. F. A. Program Chairman Serge Kovaleff, who also is a member of A. S. M. Mr. Kovaleff introduced the speakers, the first being A. L. Lyman, manager, Richmond Research Laboratories, Standard Oil Co. of California, who gave a paper on the history of petroleum from the earliest Biblical records down to the present, discussing in greater detail what the recent developments had been in the increasing use of petroleum.

P. M. Joslyn, the second speaker, went into the problems encountered in outfitting ships for service. The firm of Joslyn & Ryan, naval architects, has in its employ more than 200 architects and detailers working on orders of the U. S. Navy and Maritime Commission. Mr. Joslyn explained that drafting of hulls was one thing, but that specifications for outfitting was another and of particular interest to the members of the groups he was addressing. In answering the question of required inspections, he recommended a central location where manufacturers could see and examine parts similar to those being produced in order to minimize uncertainty of requirements. He also stressed the need for co-operation between manufacturers to secure full use of available production equipment. Mr. Joslyn spoke on the necessary change in certain castings to meet the unusual conditions imposed by exposure to torpedoes and depth bombings. He compared construction of ships' hulls by the riveting method with the recent process of electric welding, explaining some of the difficulties encountered in pre-assembly of large welded units for quickly constructing a ship for early launching.—*George L. Kennard, secretary-treasurer.*

Chicago

PLANT protection, safety and good housekeeping are elements which play a prominent part in maintaining war goods production. This was the viewpoint taken by W. E. George, assistant to the management, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., In addressing more than 200 members of the Chicago Chapter of the A. F. A. at the Chicago Bar Association, Feb. 1. A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill., officiated as technical chairman.

A company which places emphasis on those factors will attract a better type of workmen, will increase plant efficiency, and will achieve higher unit outputs, Mr. George declared. Most of his address consisted in detailing procedure which his company practices, but most of this was of a type which can be applied to any plant or foundry, large or small, highly mechanized or manually operated. Among phases covered were thorough pre-employment examinations, health service, safety, plant cleanliness, fire protection, police protection, property guarding, anti-sabotage measures, air raid protection and similar matters.

Among personnel problems, absenteeism is one which is extremely baffling of solution. Rate of absenteeism varies from 3 to 18 per cent, and is a serious handicap to fulfillment of production schedules. Chief cause appears to be that some workers are earning more than at any previous time in their lives and considerably more than living expenses require, consequently they are inclined to lay off periodically. Any means to reduce absenteeism fails to be effective after a brief period and new schemes must be devised.

Next regular chapter meeting will be on March 1, with the program devoted to five round table discussions. Topics announced: Steel division, "Salvage and Substitute Materials"; gray iron, "Cores —Materials, Equipment and Results;" malleable, "Current Sand Control Practices"; nonferrous—"Melting of Nonferrous Metals"; and pattern division, "Substitution of Metal Parts for Patterns".—*Erle F. Ross.*

Philadelphia

JANUARY meeting of the Philadelphia Chapter of the A.F.A. was held on Friday, Jan. 8, at the Engineers Club. The evening was designated as Nonferrous night. One hundred members and guests were treated to two fine talks, the first by C. L. Warwick, chief, Specifications Branch, WPB, and the second by C. S. Cole, chief, Metal Section, WPB.

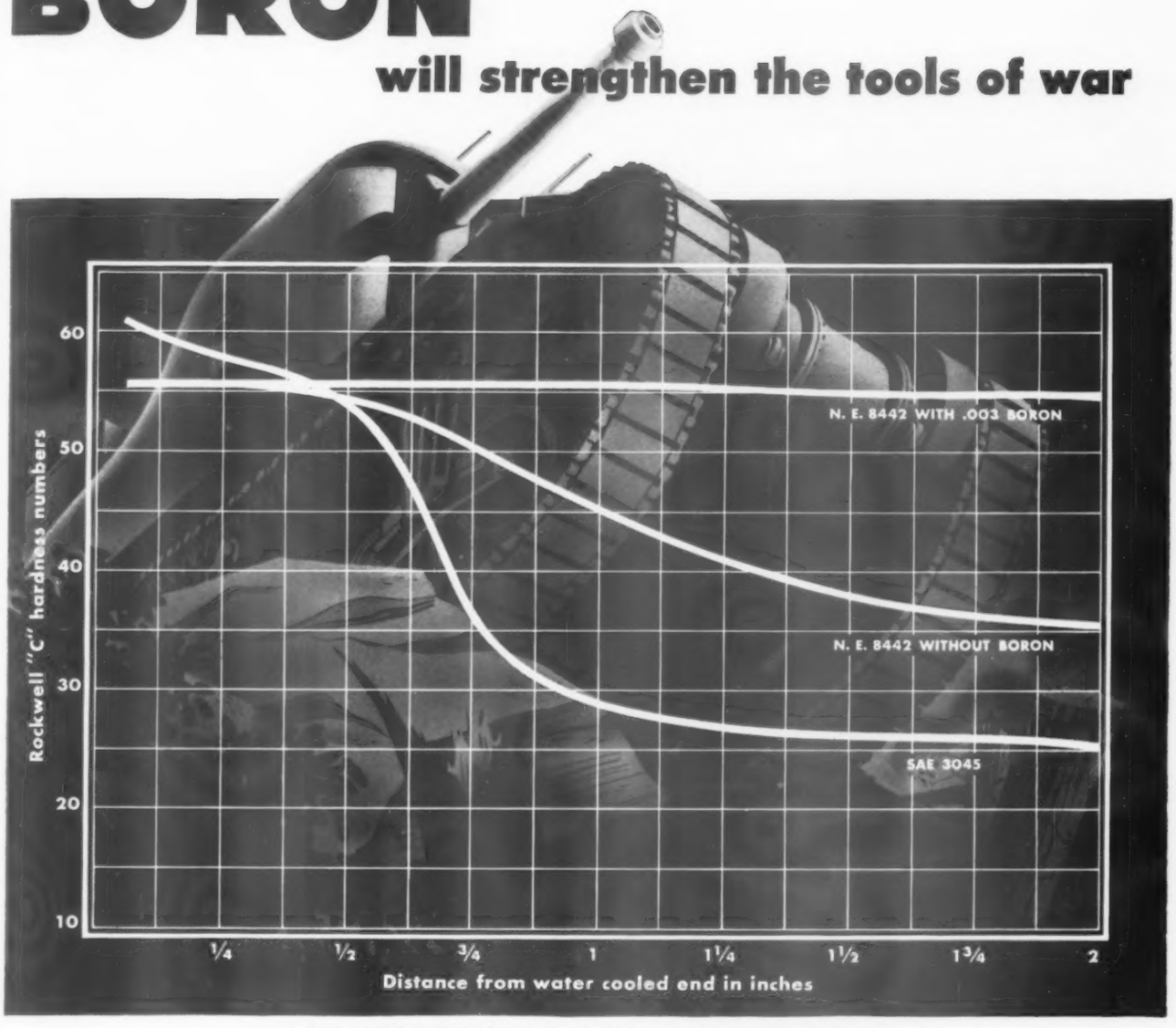
Mr. Warwick needs no introduction since he is well known as secretary-treasurer, American Society for Testing Materials for many years. His remarks regarding the work that his department is doing were both interesting and enlightening. He explained the vast amount of work required in developing alternate emergency specifications for the conservation of critical materials. The Specification Branch was composed of 35 men, all well known in their respective fields. He pointed out that through revised specifications such savings of critical materials as 10 per cent on structural steel, 20 per cent on reinforced steel, 30,000 pounds of tin, 50 per cent on steel wiring and fencing, and 400,000 tons of steel in the housing program were possible. He explained that further savings were necessary and that it was squarely up to foundrymen to make suggestions that would save critical materials and to call the attention of the department to specifications on which less critical materials might be substituted. Mr. Warwick told how the department was working closely with our Allies on all lend lease materials to have them adopt our specifications. Progress also is being made on standardization of design specifications as applied to design stresses on timber and also bridge steel and concrete.

Mr. Cole also spoke on conservation of critical materials. He showed an interesting chart which gave specific changes possible in present nonferrous specifications to conserve critical materials. (This chart is reproduced on page 87 of this issue of THE FOUNDRY.) Mr.

(*Continued on page* 144)

BORON

will strengthen the tools of war



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Boron is used to enhance the properties of armament steels, in rapidly increasing volume.

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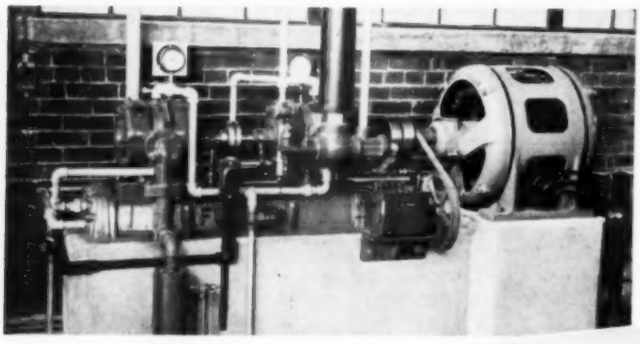

February 23, 1942.

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(*Continued from page* 142)

Cole illustrated the problem by stating that present specifications calling for "G" metal in castings often could be changed to call for use of secondary and scrap metals in the 85-5-5-5 class, thus saving quantities of new metals which are called for in the higher grade metal. It was explained that the well known 88-10-2 metal could contain up to 1 per cent lead on new specifications. He stated that most of the other standard specification metals could in most cases be moved down the chart to lower grades.

Mr. Cole pointed out that the conservation program could be helped greatly if foundrymen would check closely specifications called for on every order they received for nonferrous castings, and make suggestions to the specifications branch regarding possible changes. He stated that 90 per cent of all tin was in enemy hands, and that the importance of conserving this metal was brought out in the President's report on 1942 production. Small arms ammunition was three times that produced in World War I and artillery ammunition produced was ten times that of the same war. Mr. Cole closed his talk by giving the definition of the word conservation as, "Makes available more planes, tanks, guns, ships and ammunition sooner." In the discussion that followed, many interesting questions were brought out.—*William S. Thomas, publicity committee.*

Minnesota U.

AN INCREASED interest in foundry work at the University of Minnesota, Minneapolis, has increased the membership of the Student A. F. A. Chapter rapidly, and it now has approximately 30 members. The group held a luncheon meeting Jan. 18 in the Minnesota Union and had as a guest, Robert E. Kennedy, secretary of the American Foundrymen's Association. Mr. Kennedy gave a short talk and explained why technically trained men are needed in the foundry industry. After the meeting, Mr. Kennedy spent some time looking over the University's foundry and foundry laboratory.—*Stanley Tingquist.*

Southern California

REGULAR meeting of the Southern California Chapter of the A. F. A. was held at the Elks' Club, Los Angeles, Jan. 15. Chairman Earl Anderson, Enterprise Iron Works, Los Angeles, presided over the dinner and technical session. Leo H. Klitsche, co-ordinator, War Production training program in vocational education, proposed to the chapter its taking full advantage of the foundry training facilities in the Los Angeles city school system, both for youngsters and adults. An opportunity is open for men and women, not engaged in essential work, to receive training in a vital industry. Robert Gregg was

(*Continued on page* 146)

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Savings up to $150 a month are often reported by enthusiastic users of Kane & Roach Core Wire Straighteners! Don't neglect this hidden source of cash! Your used wire—even if it's badly bent—can be restored over and over again with these fast-working, economical machines. Now—when conservation of all metal is a vital factor in war-industry, Kane & Roach Straighteners fulfill a more important need than ever. Kane & Roach machines not only save valuable core wire but they pay for themselves so fast that scores of foundrymen have reordered as many as three or four after a short trial of one.

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(*Continued from page* 144)

appointed chairman of a committee to meet with the board of education to get a program rolling.

More than 150 members and guests turned out to hear the principal speaker, Harry W. Dietert, Detroit, who explained the necessity of making sand and its problems interesting to foundrymen in order that difficulties encountered by the industry may be brought to light and solved. Mr. Dietert then proceeded to reveal the behavior of sand and sand mixes at pouring temperatures by means of a colored motion picture showing tests run in a dilatometer. He proved that molding and core sands must be mixed, bonded and handled with knowledge and care to obtain efficient foundry practice. Mr. Dietert is to be complimented for his efforts to benefit the foundry industry.—*E. M. Hagener, secretary.*

Central Indiana

MONTHLY meeting of the Central Indiana Chapter of the A. F. A. was held Feb. 1 at the Washington Hotel, Indianapolis with 65 members and guests present. B. F. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, and chairman of the chapter, presided. Principal speaker at the meeting was H. E. Baughman, manager, Coke plant, Wheeling Steel Corp., Portsmouth, O., whose topic was, "Coke and By-Products".

Mr. Baughman presented to the group a descriptive talk on the subject. The question period after the discussion was lively since there is considerable information desired on the handling of coke these days when materials are so difficult to obtain.—*Ralph A. Thompson, secretary.*

Metropolitan

A SPLENDID turnout welcomed President of the A. F. A., Duncan Forbes, Gunite Foundries Corp., Rockford, Ill. at the dinner of the Feb. 1 meeting of the Metropolitan Chapter of the A. F. A. held at the Essex House, Newark, N. J. Mr. Forbes spoke and pointed out the prime purpose of the association, namely, to expound technical and practical information to the foundrymen.

Fred Foxall, assistant general manager, foundry department, Eclipse-Pioneer Division, Bendix Aviation Corp., Bendix, N. J., was the principal speaker of the evening, and he presented an excellent description of the steps to be taken in laying out a high production magnesium sand casting foundry. One of the most important points stressed was the necessity for allowing sufficient storage space between different operations in order to smooth out the production flow. He also stressed the importance of having sufficient melting capacity, due to the large gates and risers and ordinary metal loss

encountered in the magnesium foundry. After reviewing the equipment necessary for a continuous foundry, Mr. Foxall described the course of a casting through the foundry from melting through to shipping, and on the way touched on all phases of magnesium foundry operation.

Next meeting of the Metropolitan Chapter, will be held March 1 at the Essex House, Newark.—*R. E. Ward, chairman, publicity committee.*

E. Canada - Newfoundland

RECENTLY formed Eastern Canada & Newfoundland Chapter of the A. F. A. is proving an energetic and enthusiastic addition to the association, growing in numbers at no small rate with the passing of each month. On Jan. 22, the latest of a series of successful evenings was addressed by A. W. Gregg, Whiting Corp., Harvey, Ill., whose subject, "Cast Iron Melting Practices" was featured by a description of the most recent practices and adaptations of cupola melting methods, including triplex melting for production of steel and desulphurizing and dephosphorizing methods, and possibilities. Some sound advice also was given on every day cupola operation and a motion picture illustrating his descriptions rounded out the subject.

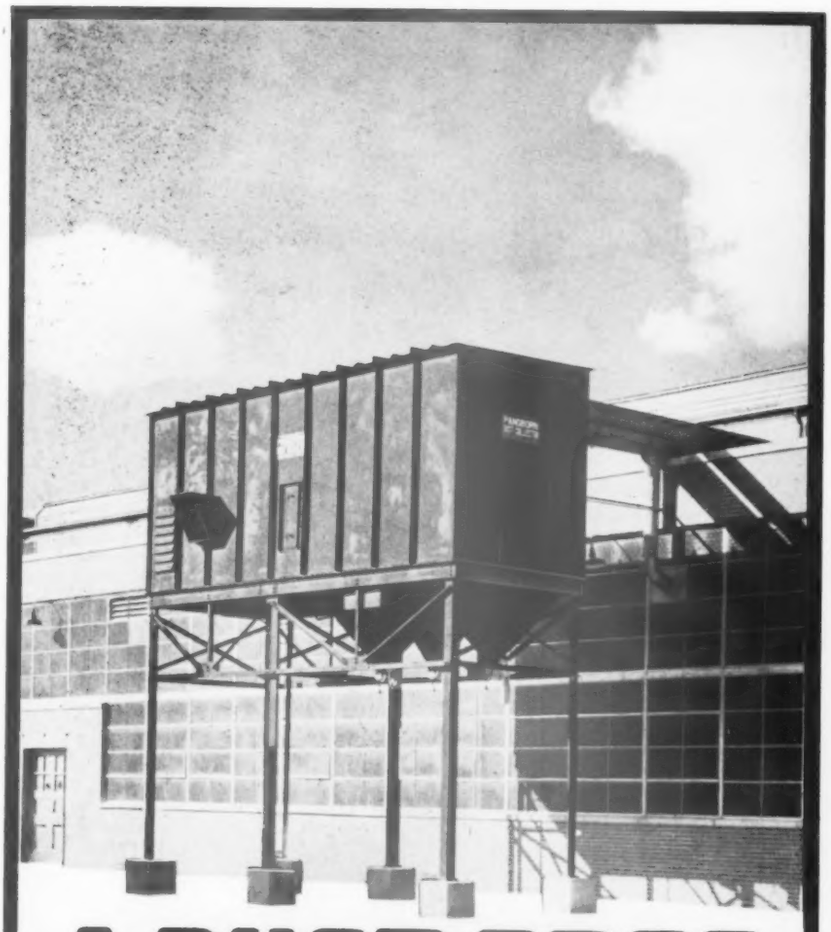
The 100 members and guests present gave evidence of their interest by the many questions asked the speaker following the talk.—*A. E. Cartwright.*

Wisconsin

DESPITE one of the worst blizzards in many years, there was a large attendance of members and guests at the Jan. 15 meeting of the Wisconsin Chapter of the A.F.A. on hand to greet the three national officers of the association who were present at the meeting.

Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill., national president, complimented the chapter upon its energetic activities, and said he was favorably impressed by what he heard and saw while attending the chapter's war problem committee meeting that afternoon. Robert E. Kennedy, national secretary, discussed plans being made for the second war production foundry congress to be held in St. Louis in April. Ben D. Claffey, General Malleable Corp., Waukesha, Wis., a national director, announced that Roy M. Jacobs, president, Standard Brass Works, Milwaukee, and former president of the Wisconsin chapter, had been nominated a director of the national organization. After several announcements by President George K. Dreher, Ampco Metals Inc., Milwaukee, the meeting divided into six sectional sessions for the technical meeting.

R. G. McElwee, Iron and Steel Division, War Production Board, and long connected with Vanadium Corp. of America, spoke to the gray iron section on,



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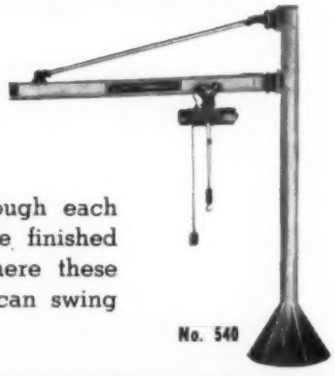

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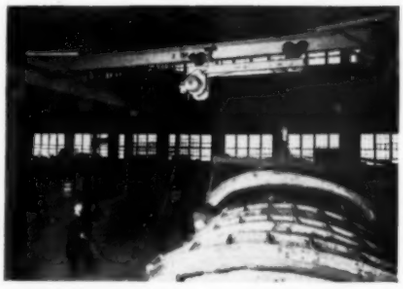

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"Making Every Ounce Count". He outlined substitutes that could be used in place of former alloys. He urged greater use of those materials still available and greater benefit from the use of risers and the like. In his opinion, casting should be selected for the shops best adapted for a particular type of work rather than for each foundry to endeavor to make too wide a variety of work. Frank Waldenmeyer, A. J. Lindemann & Hoverson Co., discussion leader, directed the discussion period.

E. W. Zick, General Malleable Corp., Waukesha, Wis., addressed the malleable group on "Using the Things You Formerly Threw Away". He disclosed several excellent ideas he had developed on conservation and reclamation of numerous waste items.

Combustion problems and furnace atmospheres were explained in an interesting manner to the nonferrous section by R. G. Guthrie, consulting metallurgist, Chicago. The steel session with Charles Fuerst, Falk Corp., Milwaukee, as chairman, listened to an interesting talk on molding and core sand problems presented by Charles Schuremann, consulting engineer. Highlights were his comments on proper shape and distribution of sand grains, desirability and methods of developing essential plasticity; the effect of refractories on molding sands, and methods of preventing veins and cracks. The speaker's theories were debated vigorously in a lively discussion that followed.

Arthur Koehler, Forest Products Laboratories, Madison, Wis., discussed, "Wood for Pattern Construction," before the pattern group in which he touched upon the subject of alternate materials, their workability, availability and desirability.

At the meeting the apprentice group, under the chairmanship of C. W. Morisette, Milwaukee Vocational School, conducted its first sectional session with a fine program. Robert E. Kennedy, national secretary, explained apprenticeship contests and some of his own personal experiences in the foundry. Jacob R. Van Kooy, Milwaukee Vocational School, discussed the subject from his broad experience as a teacher of vocational courses.—*George M. Pendergast, chairman, publicity committee.*

Detroit

LIGHT metals hold the spotlight, as the Detroit Chapter of the A. F. A. continued its policy of production problems roundtables for the January 21 meeting. Of the 100 men attending meeting, approximately half thronged the roundtable on magnesium foundry core practice, with discussion led by N. W. Briskin of Ford Motor Co. magnesium laboratory. Mr. Briskin displayed samples of cores used in the Ford Magnesium plant, which has been in production for over a year supplying parts for Pratt & Whitney aircraft engines, and also showed a series of slides to amplify his comment on core sands, binders, inhibitors, oxidation, etc.

First roundtable on malleable iron castings was held under direction of Carl F. Joseph, Saginaw Malleable Iron Division, and surprisingly enough drew an unusually large group. As a result of the interest in malleable, a second roundtable on the subject was scheduled for the February meeting to consider malleable in ordnance.

The regular discussion period on steel castings was in charge of Fred A. Melmoth, Detroit Steel Casting Co., and chapter chairman, who continued from the previous meeting an analysis of heading and gating problems. C. E. Silver, Michigan Steel Casting Co., is in charge of the season's schedule of roundtables on steel, and has managed to keep discussion moving at a lively pace.

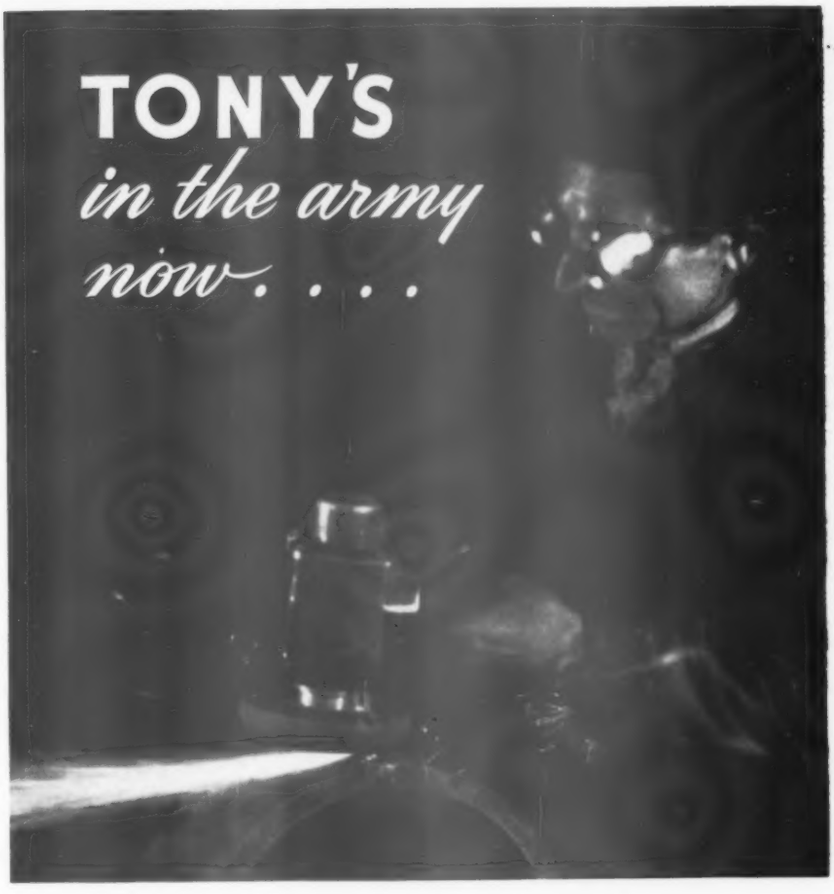
Atmosphere control in bronze melting was the general subject considered at the brass and bronze group meeting, with G. J. LeBrasse, Federal-Mogul Corp., introducing the comment. J. P. Carritte Jr., True Alloys Inc., is group chairman for this activity.

Preceding the four roundtable discussions, a highly interesting moving picture was shown dealing with the processing of aluminum from mines to metal. This is the latest in a series of sound pictures released by the Aluminum Co. of America, and though designed to interest laymen as well as engineers, it had the professional touch and drama to hold the attention of the entire audience.—*Art H. Allen, secretary.*

Western New York

ANNUAL stag party of the Western New York Chapter of the A. F. A. was held at the Troop 1, American Legion Club House, Buffalo, on Jan. 15. Frank Bates, vice chairman of the chapter presided. Special guests included Ed Meade, Sargeant & Greenleaf Co., Rochester, N. Y. who gave full information on the meeting to be held in Rochester, N. Y. on Feb. 6; and Prof. John McManus, University of Buffalo, who announced the extension courses offered at the University of Buffalo, by the Engineering College of Cornell University. The courses will deal with metallurgy and related foundry subjects. Three hundred eighteen members and guests attended the meeting and all agreed that the food and entertainment that followed the business meeting left nothing to be desired.

Officers, directors and members of the Western New York Chapter of the A. F. A. turned out in force to attend the Feb. 6 meeting of the chapter which was held at Hotel Seneca, Rochester, N. Y. Approximately 160 members and guests were in attendance. The group was honored by the presence of Robert E. Kennedy, A. F. A. secretary from Chicago, who talked on the progress of the chapter and its well attended activities. Chairman Ralph T. Rycroft, Jewell Alloy & Malleable Co., Buffalo, called on Don Bishor to introduce the speaker of the evening, H. H. Judson, foundry super-



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intendent, Gould Pumps Inc., Seneca Falls, N. Y., who spoke on "Nonferrous Castings", a subject in which he is well versed due not only to much scientific research, but also to many years of practical experience.

Chairman Rycroft announced the appointment by the directors of Ed Meade, Sargent & Greenleaf Co. Inc., Rochester, to fill the unexpired term of Frank Comerford who has moved to Pittsburgh. Through the courtesy of Irving Rosenthal, Rochester Smelting & Refining Corp., the group was treated to a wonderful floor show. After which, the group also enjoyed seeing the film "Sand" shown through the courtesy of Whitehead Bros. Co.

March 5 meeting of the chapter will be held at Hotel Touraine, Buffalo, at which Thomas E. Barlow, Vanadium Corp. of America, Detroit, will speak on, "Alloy Inoculations".—*John R. Wark, secretary.*

Twin City

IN SPITE of 20 degrees below zero weather, 48 members and guests of the Twin City Chapter of the A.F.A. were on hand for the Jan. 18 meeting of the chapter held at Coffman Memorial Union, University of Minnesota. Chairman Max Aker, Western Alloyed Steel Casting Co., presided. Robert E. Kennedy, A.F.A. secretary was introduced and he gave a few words of encouragement to the members. Dr. E. G. Meiter Employer's Mutual Liability Insurance Co. of Wisconsin, spoke on "Foundry Hazards". The talk was presented in an interesting manner and was illustrated by an exhibit of safety devices. Following the talk there was a lively discussion period.—*O. W. Potter, secretary.*

Ontario

AN EXCELLENT attendance was present at the meeting of the Ontario Chapter of the A. F. A. at Hamilton, Ont., on Jan 29 with the double attraction of Harry W. Dietert's illustrated address on "The Effects of High Temperatures on Core and Molding Sands" and the annual visit of the A. F. A. president to the chapter. Chairman J. J. McFadyen, Galt Malleable Iron Co. Ltd., presided at the meeting with G. O. Loach, Otis-Fensom Elevator Co. Ltd., Hamilton, acting as technical chairman.

Following dinner, President Duncan P. Forbes, Gunite Foundries Inc., Rockford, Ill., spoke briefly upon the work of the American Foundrymen's Association. He reminded the group of the convention at St. Louis, April 28 to 30 and told of the excellent wartime program which is being organized for the meeting. President Forbes referred to the enormous amount of work which has been done by the A. F. A. and to the technical information which is available through it. He felt that if the technical advantages of the association could be sold more thoroughly to the foundry industry, it would constitute a big step in aiding the business to meet growing competition from other fields.

The A. F. A. foundation also was discussed briefly as a means of undertaking fundamental research without raising association fees. There will be a big job to be done when the war ends to aid the foundry industry in improving the quality of castings and maintaining and expanding its field of casting sales.

In the technical address of the evening, Harry W. Dietert gave the chapter an excellent understanding of the effect of high temperatures on core and molding sands. Approximately 1200 feet of colored motion picture film made a real contribution to the lecture indicating more clearly than any verbal description the reaction of sand to high temperatures. The work described by Mr. Dietert was done by using a dilatometer equipped with a high temperature electric furnace with an opening in the wall through which the sand specimens were studied. Sand specimens placed in the dilatometer show an expansion with rising temperature with a slight lag resulting from phase change in the silica particles. The expansion is due to growth of the silica grains and may be followed at still higher temperatures by contraction resulting from the clay reaching its fusion point. Where expansion is so great as to cause difficulties in casting it may be reduced by

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various modifications of the sand. Work on core mixtures indicates that no other material in the foundry responds more quickly to control. It is important with cores that the collapsibility should be adjusted properly for the job in which it is used. Fissures are likely to result when the core surfaces collapse ahead of the metal solidification. When it is necessary to slow up collapsibility of the core, an addition of 2 per cent iron oxide is quite effective, forming a flux which bonds the core sand grains together.

Mr. Dietert claimed silica flour is much more effective than any other material in improving the hot strength of cores. The most important point in regard to a core is its retained strength. This may be modified over a wide range by changes in the core sand. In many types of castings, if the core has too high a retained strength, cracking of the casting on solidification and cooling will result. In one instance where trouble of that kind was encountered, a drastic reduction in the retained strength of the core eliminated all cracking.—*G. L. White, secretary, treasurer.*

Cincinnati

DESULPHURIZATION and metal purification was the topic up for discussion at the Jan. 11 meeting of the Cincinnati District Chapter of the A.F.A. held at the Cincinnati Club. Fifty members and guests were present to hear George S. Evans, Mathieson Alkali Works, New York, who covered the subject both in relation to operation of the cupola and in refining at the ladle. Mr. Evans outlined the initial research with soda ash, included a discussion of the values of various fluxes, limestone, dolomite, etc., and discussed their effect on linings and slags. He added his hearty endorsement of the A.F.A. project for cupola research.

Regular February meeting of the Cincinnati District Chapter of the A. F. A. was held jointly with the local chapter of the American Society of Metals at the Cincinnati Club, Feb. 8.

Present at the meeting was Duncan P. Forbes, national president of the A.F.A., and president, Gunite Foundries Corp., Rockford, Ill., who urged attendance at the coming foundry war production congress to be held in St. Louis in April as the annual convention of the A.F.A.

Chairman Frank E. Hutchinson, Reliance Foundry Co., Cincinnati, turned the meeting over to the chapter's past chairman W. M. Ball Jr., Edna Brass Mfg. Co., Cincinnati, who is serving this year as chairman of the A. S. M. group in Cincinnati. Thomas E. Barlow, Vanadium Corp. of America, Detroit, was the speaker and his topic was, "Material Substitutions".

Mr. Barlow's previous background with ferrous and nonferrous foundry work, together with experience in handling various alloys, qualified him to make an interesting and instructive technical presentation. Substitutions which are undertaken from necessity of critical metals often work out better than the original alloy. Mr. Barlow first took up substitutions as applied to basic metal practice, which he illustrated with various examples. Consideration then was given to the design of castings as to cross sections, etc., use to which castings will be put, chemical analysis of alloys and, inoculation with ladle additions. Dr. Smith of A. S. M. was introduced and led the discussion which followed Mr. Barlow's address. Number and variety of questions reflected the interest and appreciation of the audience.

H. G. Lamker, superintendent of foundries, Wright Aeronautical Corp., Paterson, N. J., will speak on "Magnesium and Aluminum" at the March 8 meeting of the chapter to be held at the Cincinnati Club.—*Henry M. Wood, secretary.*

Western Michigan

SIXTY-FOUR members and guests of the Western Michigan Chapter of the A.F.A. attended the Jan. 11 meeting of the chapter held at the Ferry Hotel, Grand Haven, Mich. Rudy Flora, chairman of the cupola research program, reported on the contributions to the program. C. M. Clover, chairman of the membership committee, reported nine

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THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

prospective members for the chapter.

Fred G. Sefing, International Nickel Co., and chairman of the Metropolitan Chapter of the A.F.A., presented an interesting talk on "Structure Versus Wear". The subject dealt principaly with gray iron and its relation to wear in regard to different types of structure. The speaker showed several micrographs illustrating the types of structure that gave good wear and the types that did not. Especially stressed was the importance of the proper graphite pattern. The meeting was concluded with a general discussion.

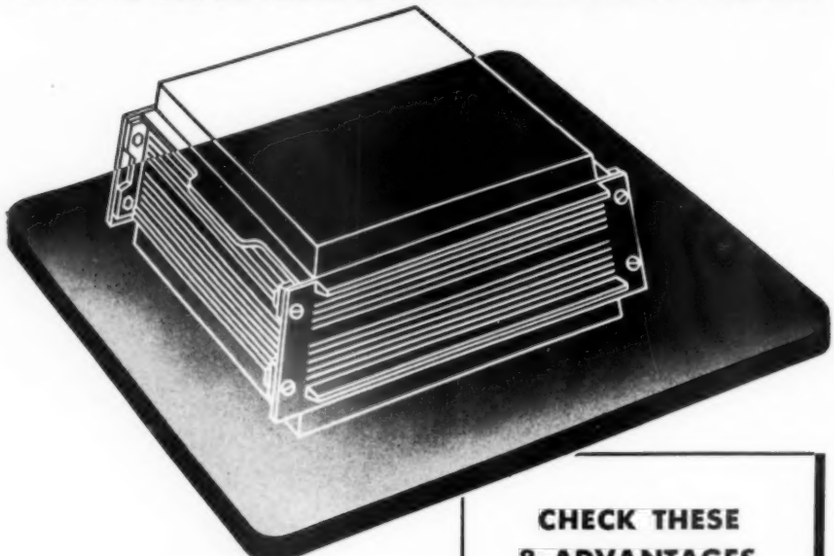
Absenteeism was the subject of a round table discussion held at the recent meeting of the Western Michigan Chapter of the A. F. A. Chapter Chairman C. J. Lonnee, Muskegon Piston Co., Sparta Division, and Program Chairman, D. F. Seyferth, West Michigan Steel Foundry Co., led the discussion. Everyone participated and many causes, remedies, and experiences were related. One fact made itself clear that everyone has trouble with absenteeism, especially now with manpower hard to replace and workers receiving good wages.

In addition, two interesting movies were shown, one entitled, "On to Jupiter," and the other a comedy called, "How Not to Conduct a Meeting". Don Seyferth had with him all pictures taken of chapter activities since the organization of the chapter, and the members enjoyed looking over the old photograph and reminiscing.

The chapter's next meeting was announced as March 8, to be held at the Ferry Hotel, Grand Haven, Mich.—*K. C. McCready, secretary.*

Improve Foundry Practice with

FOUNDRITE *Bottom Boards*



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JM PRODUCTS

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FOUNDRITE Bottom Boards

New Jersey

REGULAR meeting of the New Jersey Foundrymen's Association, held at the Downtown Club, Newark, N. J., Jan. 25, featured a talk by W. J. Maton, featuring cupola operation, iron mixtures and molding materials. In the 53 years that Mr. Maton has been connected with the Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn., he has had wide experience in the production of castings ranging from one pound to 25 tons.

Asserting that most every cupola requires a certain special technique, Mr. Maton declared that there are several essential requisites to the successful operation of such a unit. He believes there should be a good man in charge of the cupola who knows mixtures and who will see to it that the men making the mixtures carry out instructions; also he thinks a capable man should be employed to service the cupola "downstairs" and to get it ready for each day's heat.

Mr. Maton stated that control of volume air is essential and that an operator should see to it that air pipes are tight. His experience indicates that it is not necessary to pay much attention to pressure. His company has standardized pretty much on two grades of iron—a soft iron, and an iron with about 30 per cent steel. He described the soft iron as having a tensile strength of approximately 31,000 to 33,000 pounds per square inch, and as being made up of about 300 pounds charcoal, pig iron, 300 pounds malleable pig, 400 pounds Southern foundry pig, and 1000 pounds of scrap. Incidentally, he believes that a good regular grade of gray iron is excellent for bearings. The other grade of iron runs about 50,000 pounds per square inch in tensile strength and is comprised of about 400 pounds of malleable, 300 pounds of charcoal pig iron, 300 pounds of silvery pig, 600 pounds of steel and 400 pounds of scrap, with a little spiegel added. The company alloys its castings where requested and charges accordingly. Mr. Maton pointed to the value of molybdenum as an alloying element for certain purposes.

He discussed sands for mold and coremaking and made several observations as to sand room equipmeent. Since the hour was getting well along, he did not go into a discussion of cleaning room practice, he presented some printed material on the subject which he thought members might be interested in studying at their leisure.

Michael Hogan, Bierman Everett Foundry Co., Irvington, N. J., was elected vice president of the association to succeed H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J. who was forced to resign the office because

of pressure of other duties. Arthur M. Torrey, secretary, Employers Association of North Jersey, will assume the duties of secretary of the New Jersey Foundrymen's Association in the continued absence of John L. Carter, who is on temporary leave with the Office of Price Administration, Washington. As the usual time for the monthly meeting conflicts with the holidays in February, the next session is scheduled tentatively for March 1, Downtown Club, and President A. E. Winstead announced that the program would be a deviation from the usual discussion of foundry problems. Instead the speaker will be Michael M. Dorizas, traveler and lecturer, who will discuss conditions on the various war fronts, illustrating by motion pictures. —*B. K. Price.*

New England

ANNUAL meeting of the New England Foundrymen's Association was held at Hotel Gardner, Boston, Jan. 13. Reports of the various officers were read and the following officers were elected for the year 1943: President, Augustus W. Calder, New England Butt Co., Providence, R. I.; vice president, T. C. Weiser, Griffin Wheel Co., Chelsea, Mass.; treasurer, Arthur Gibby, East Boston, Mass.; secretary, Ernest F. Stockwell, Barbour Stockwell Co., Cambridge, Mass. Executive committee includes: T. C. Weiser, Griffin Wheel Co., Chelsea, Mass., chairman; M. A. Hosmer, Hunt-Spiller Mfg. Corp., South Boston, Mass.; B. W. Hagerman, Rice-Barton Corp., Worcester, Mass.; D. L. Parker, General Electric Co., Lynn, Mass.; J. Frank Dorney, Walworth Co., South Boston, Mass.; Charles A. Reed, Rogers-Brown-Lavino Co., Cambridge.

After the business meeting, a special dinner was served. Following dinner, a program arranged by Charles A. Reed was presented for the entertainment of the members.

Regular monthly meeting of the new England Foundrymen's Asociation was held Feb. 10 at the Engineer's Club, Boston, with about 70 members and guests present. Augustus W. Calder, New England Butt Co., Providence, R. I., newly elected president of the association, presided for the first time in his new office. A committee consisting of C. W. Wyatt, R. F. Harrington and B. W. Hagerman was appointed to plan a program to assist with the A.F.A. cupola research project.

Guest speaker was Maj. Alexander Smith, New England field director, Industrial Services Division, Bureau of Public Relations, War Department, who spoke on, "This Is the War". Maj. Smith is a veteran of World War I and has spent much of his life in the newspaper business. His last position in industry was that of editorial director and supervisor for all General Electric Co. publications in the U. S.

The speaker began by paying tribute to the foundry industry and complimented it upon its valuable contribution to the war effort. He stressed the need of materials and quoted President Roosevelt as saying that the turning point of the war is here, but explained that it was and would be an uphill fight from now on just as it has been from the start. There is no coasting to victory. Maj. Smith discussed the more favorable outlook at present as compared with the first year of the war, which was indeed discouraging to us. The two big things which must be accomplished as soon as possible in 1943 is to conquer the submarine menace and second, retake Burma and open the Burma road. He outlined at length the many improvements in ordnace manufacture and said that much already has been accomplished in saving time and materials. Major Smith is ready at any time to help industry and can be reached at the Industrial Service Division, Room 302, 10 High Street, Boston—*Merton A. Hosmer.*

Northeastern Ohio

MORE than 100 members and guests were present at the regular February meeting of the Northeastern Ohio Chapter of the A.F.A. held at the Cleveland Club, Cleveland, on Feb. 11. John H. Tressler, president of the chapter, presided, and the meeting opened with the presentation of a motion picture on "Care and Use of Grinding Wheels," presented through the courtesy of the

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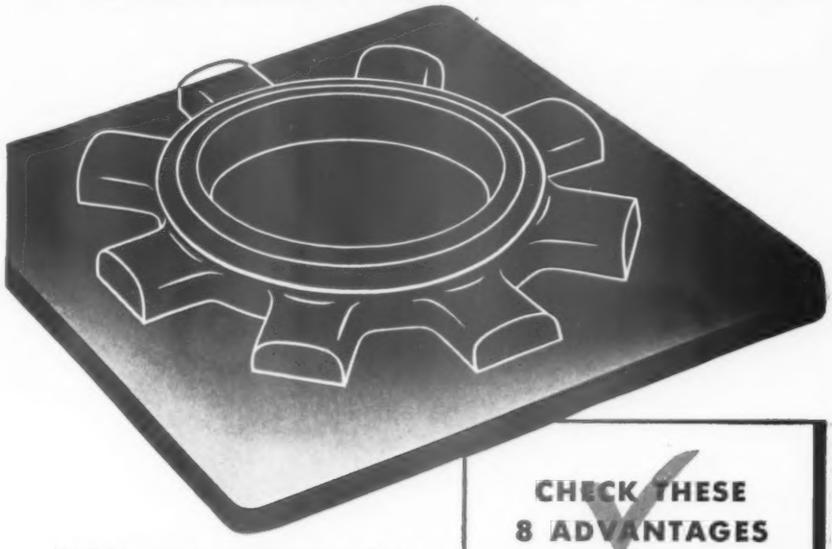

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TRANSITE Core Plates

Norton Co., Worcester, Mass. Jack Lathrop announced that the next meeting of the chapter, to be held March 11, will feature a colored motion picture "Cannon on Wings" prepared by Bell Aircraft Co., and the speaker will be A. W. Gregg, Whiting Corp., Harvey, Ill., who will discuss the "Cupola's Place in Steel Casting Production".

Principal speaker at the February meeting was Arthur J. Tuscany, executive secretary, Foundry Equipment Manufacturers' Association, Cleveland, whose topic was "Let's Look at the Foundry Industry—Winning the War—and Then What?" He pointed out that the capital investment in the foundry industry in this country is about one billion dollars, sales are in the neighborhood of three billion dollars, and the industry has about half a million employes. It is one of the basic industries since we only have to look around to recognize the important part castings play in our daily lives and activities.

Castings are important in the war effort, and few realize what an outstanding job the foundry industry has done toward winning the war. The reason for that state of affairs is that the industry is inarticulate. Mr. Tuscany urged that foundrymen get together and make a concerted effort to promote recognition of the foundry industry by first selling themselves on its importance, and then selling every person they meet. Referring to the problem of meeting war demands, he mentioned numerous difficulties encountered by foundries in obtaining materials and equipment, and stated that foundries should make every effort to obtain the highest possible priority ratings for those, since suppliers must have such ratings in order to secure their materials.

As to the future after the war, Mr. Tuscany said it will be necessary for the industry to do a first class selling job since competition with other products will be a tough battle. However, there is no reason why the industry cannot do as good a merchandising job as it has in improving its product. To do a real selling job it will be necessary for all branches to join together in an intelligent- co-operative plan to fight competition from the outside—and forget any internal differences. Such a plan is workable, as shown by the efforts of such organizations as the automobile and ice manufacturers associations, to mention but a few, in the direction of organized selling campaigns.—*Edwin Bremer, chairman of publicity.*

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Gives Lectures on Foundry Practice

A free course on the fundamentals of foundry engineering is being presented by the Stevens War Industries Training School, Stevens Institute of Technology, Hoboken, N. J. The course has been approved by the Metropolitan Chapter of the A. F. A. with lectures held either Thursday or Friday evening, and sometimes on both evenings.

Co-ordinated lectures on 10 major topics are pertinent to all foundry operations, with the lectures presented by foundrymen and engineers having broad experience in their particular fields. Subject matter applies to the four classes of metals for castings—steel, gray iron, malleable iron, and nonferrous. The government is meeting the expense of the course.

The program, now under way, is as follows: Feb. 4, 5—"Solidification and Cooling Phenomena," by W. C. Schulte, Metallurgist, Curtiss-Wright Corp., Propeller Division, Passaic, N. J.; Feb. 11, 12, 18, 19, 25—"Pattern Design," by William Wagner, vocational arts instructor, Irvington schools, Irvington, N. J., and also of Worthington Pump & Machinery Corp., Harrison, N. J.; Feb. 26, March 4—"Molding and Core Sand," by C. B. Somers, foundry engineer, Whitehead Bros. Co., New York; March 5, 11—"Sand Binders and Inhibitors," by G. Watson, assistant chemist, American Brake Shoe & Foundry Co., Mahwah, N. J.; March 12, 18—"Effect of Sand and Facings on Soundness, Finish and Cleaning of Castings," by W. Rose, sand engineer, Wright Aeronautical Corp., Paterson, N. J.; March 25, 26—"Directional Solidification of Casting Materials," by Charles W. Briggs, technical and research director, Steel Founders' Society of America, Cleveland; April 1, 2, 8—"Melting and Pouring," by John A. Bu-

kowski, plant metallurgist, Worthington Pump & Machinery Corp.; April 9—"Cleaning of Castings," by Fred Mosley, engineer, Whitehead Bros. Co.; April 15—"Reclamation of Foundry Materials," by W. Rose, Wright Aeronautical Corp.; April 16—"Annealing and Heat Treatment," by R. E. Ward, Bendix Aviation Corp.; April 22, 23—"Necessity of Proper Foundry Control," by F. G. Sefing, metallurgist, International Nickel Co., New York.

Discusses Placing of Women in Foundries

Because the present critical manpower situation seriously threatens production of war goods, the war problems committee of the Wisconsin Chapter of the A.F.A., met at the Schroeder Hotel, Milwaukee, on Jan. 15, and studied the possibility of women replacing men in making castings for ordnance, tanks, armament, navy parts and other vital war materials.

Dr. Paul A. Brehm, director, industrial hygiene division, Wisconsin State Board of Health, in a talk to the group, declared industry is forced of necessity to accept the fact that women now have to do the work of men in most plants. Management and its superintendents and foremen will have to change their former ideas on this subject. In certain skilled jobs women, who previously were thought to be ineligible, now are producing at a greater rate than men. They take greater patriotic pride in their work. Mr. Brehm stated that it is not necessary for women in industry to submit to physical or medical examinations more often than once a year the same as has been the practice for men workers. However, he strongly cautioned that women replacing men in industry should be compelled to inform management of prospective motherhood.

Dr. Stewart Scrimshaw, associate dean, College of Business Administration, Marquette University, declared that employment of women in industry to be an absolute necessity, because of the lack of young men for such training. It is not necessary to obtain women to teach such women replacements, although women supervisors might prove beneficial in many instances, he said. Women will accept teaching and training from men if they recognize that the men know their business. Women can be taught easily to do the most skilled jobs. They now are trained to grind tools and to do other skilled work that formerly were assigned to men. Dr. Scrimshaw declared he recently had conducted a group of women through a foundry and was surprised at the highly intelligent questions they asked. He said his experience had been that foremen and supervisors, who formerly opposed women in industry, now were extremely enthusiastic over the fine work these women were doing in their shops. He recommended that women should not work more than 8 hours or on late shift, whenever the latter was practicable He suggested they be compelled to wear proper protective garments, especially for the hair, be given adequate mechanized equipment to make the work as easy as possible, and provided with satisfactory sanitary facilities and rest rooms. In addition to the customary lunch period, he recommended occasional short rest periods, which he believes would improve production.

The committee's conclusions after careful surveys were that women cannot be confined to one particular shift, but would have to be distributed throughout the customary three shifts. The committee urged the same pay for women for equal jobs, which it felt would inspire better workmanship. The pouring of molten metal, except in pouring with hand ladels where greater strength is required, should not prove more hazardous for women than for men, the committee found. It was recommended that women be used as widely as possible. Jobs for which women could be employed in the foundries included bench and squeezer molding, with men to carry away the molds, core making, the operation of mechanized sand mixers, straightening presses, and other mechanized equipment. It was pointed out that for years women have been employed as core makers in foun-

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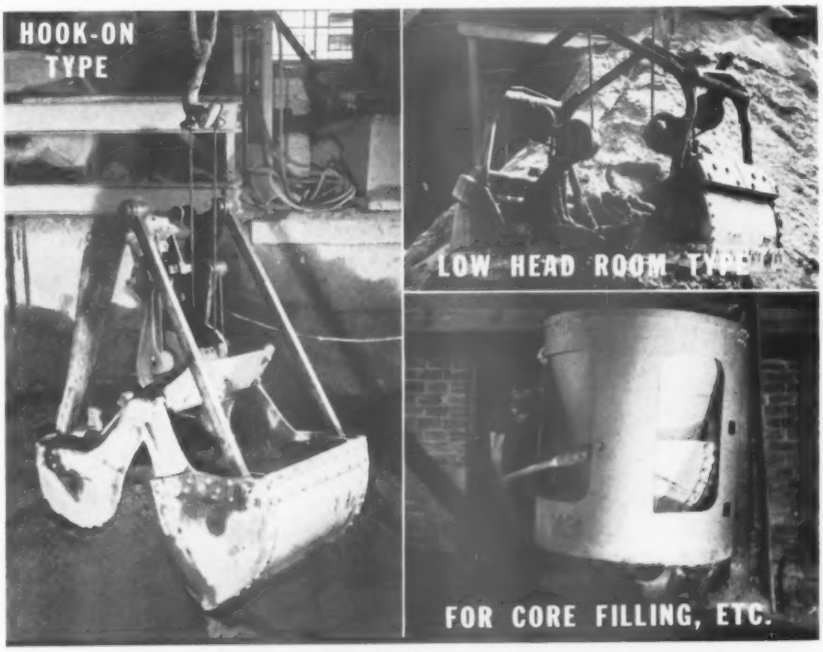

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dries and that during World War I. when foundries were not as mechanized as they are today, many women did very satisfactory work on other jobs in foundries.

Starts Second-Year Lecture Course

Chicago Chapter of the A.F.A. started its 1943 lecture course Feb. 3 with a series of six lectures. The current series is the second year of a 4-year educational program set up by the chapter. The program is designed to benefit young men and apprentices aspiring to be supervisors; foundrymen and salesmen eager to broaden their knowledge of foundry practice; and all others interested in better castings. The 1942 lectures were broad and of an introductory nature; 1943 lectures are more advanced and deal with current practice. Meetings are conducted at 7:15 on specified Wednesday evenings in the auditorium of the Peoples Gas Light & Coke Co., 122 South Michigan Avenue. J. C. Thomas, Whiting Corp., Harvey, Ill., is secretary of the course. The lectures have been arranged as panel discussions with a technical chairman and several authoritative speakers. The following is the schedule of lectures:

Feb. 3—"Melting Methods and Equipment—All Kinds". Technical chairman, A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill.

Feb. 17—"Cast Iron and Malleable Iron Melting Practices". Technical chairman, C. E. Mate, foundry superintendent, Greenlee Foundry Co., Chicago.

March 3—"Steel Melting Methods and Equipment". Technical chairman, L. H. Hahn, metallurgical superintendent, Sivyer Steel Casting Co., Chicago.

March 17 — "Nonferrous Melting Practices". Technical chairman, Chester Faunt, Christensen & Olsen Foundry Co., Chicago.

March 31 — "Refractories for Furnaces". Technical chairman, John Owen, sales engineer, Harbison-Walker Refractories Co., Chicago.

April 14 — "Ladle Refractories and Ladle Practice". Technical chairman, Grif Kennelley, sales engineer, General Refractories Co., Chicago.

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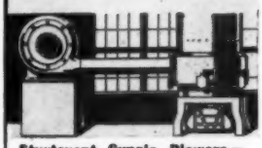

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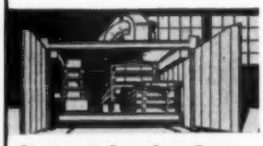

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Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sand-blasting operations.

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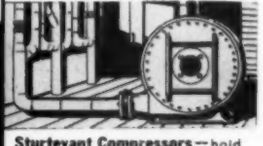

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Instructions in the Care of Fire Hose

By MICHAEL BERMAN
Technical Superintendent
Hewitt Rubber Corp., Buffalo

Industrial plants, as well as municipal fire departments, must give their fire hose expert, systematic care to get the most out of the equipment. The following suggestions, originally worked out for municipal fire departments, should be of value to maintenance men employing fire hose in or about the plant.

1. When new hose is received, do not allow it to remain packed in cases until required. Remove from cases and loosen the coils.

2. Do not allow hose to remain in trucks or on reels if wet or muddy. Remove all mud by washing or brushing with a coarse broom and expose to air, in towers or on racks, preferably at full length, to dry. Hose that is antiseptically treated will not mildew or rot if given ordinary care, but continual dampness is injurious to cotton fabrics. Mud often contains metallic or other substances chemically injurious to hose if permitted to remain on it.

3. Do not permit hose to remain on apparatus for any great length of time when not used. It should be removed, hung up in towers or on racks, and replaced with a fresh supply. Avoid short bends in hose that is stored. When necessary to store hose in folds, they should be changed occasionally to overcome permanent set in the rubber lining.

4. Unless hose is likely to encounter a freezing temperature, it is not necessary to drain the water out perfectly, as the rubber lining isn't injured by dampness within. On the contrary, hose is

benefited by remaining in a moist condition. All rubber lined hose should have water passed through it at frequent intervals to moisten the rubber.

5. Hose when frozen is liable to crack if bent while in that condition. Extreme cold causes rubber to deteriorate, but not sufficient to prevent storage of hose in cold hose houses if thoroughly drained and dried.

6. Avoid exposure of hose to hot, dry air, and it should not be stored where exposed to the sun's rays. When hose must be kept in hot, dry places, it is best to pass water through it monthly.

7. When fire hose is being used, see that section nearest engine or hydrant is not chafed at point of contact with the ground by vibration.

8. Acids and other chemicals, also fumes arising from some processes are injurious to hose and contact with them is to be avoided.

9. When discharging or recharging chemical engines or extinguishers, see that solutions used do not come in contact with the hose.

10. Before returning hose to apparatus or reel, see that the sections (or line of hose) are not twisted. Each section should be laid out straight and perfectly flat on the floor or ground and carefully examined. If not twisted the sections or line of hose will collapse naturally in a flattened condition. If twisted, the irregularities will be observed when folding the hose on the apparatus or when applying it to the reel.

Discusses Analyses Of Boron

The first symposium on methods for analysis of boron in steel, which was held recently at the University of Pittsburgh, centered primarily on a discussion of three methods of analysis for boron—(1) the distillation-titration method, (2) the colorimetric method, and (3) the spectrographic method.

The session was sponsored jointly by the university and Molybdenum Corp. of America, and the first paper on the program was presented by W. D. Sayre, Duquesne works, Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Sayre described a year of work with the distillation-titration method for boron determination. This method can be used successfully in the determination of quantities varying from 0.0001 to 0.005 per cent of boron.

Under general continuous laboratory practice, steels containing small quantities of boron can be analyzed to plus or minus 0.0003 per cent boron. There are still some unanswered questions on the use of this process. Some work has indicated that the amount of borax present in the laboratory glass ware as borates may have an effect on the end result. The chief disadvantage of this method is the long procedure required.

John L. Hague, National Bureau of Standards, Washington, one of the authors of the first paper published on this method for the determination of boron, presented some observations on the method from the laboratory of the National Bureau of Standards which have been developed since the publication of the original paper No. 1120. Mr. Hague's remarks included a new technique for determining boron content of the residual matter left as a by-product of the distillation-titration process. Results of these determinations show that in most cases the quantity of boron remaining in insoluble compounds is actually larger than the dissolved boron. In virtually every case the end analysis of standard samples shows that this method gives less than actual content.

The colorimetric determination of boron was described by L. C. Flickinger, Youngstown Sheet & Tube Co., Youngstown, O. This method depends on the use of an indicator known as quinalizarin. Success of this process depends on the constancy of the indicator and of the acid used as a solvent.

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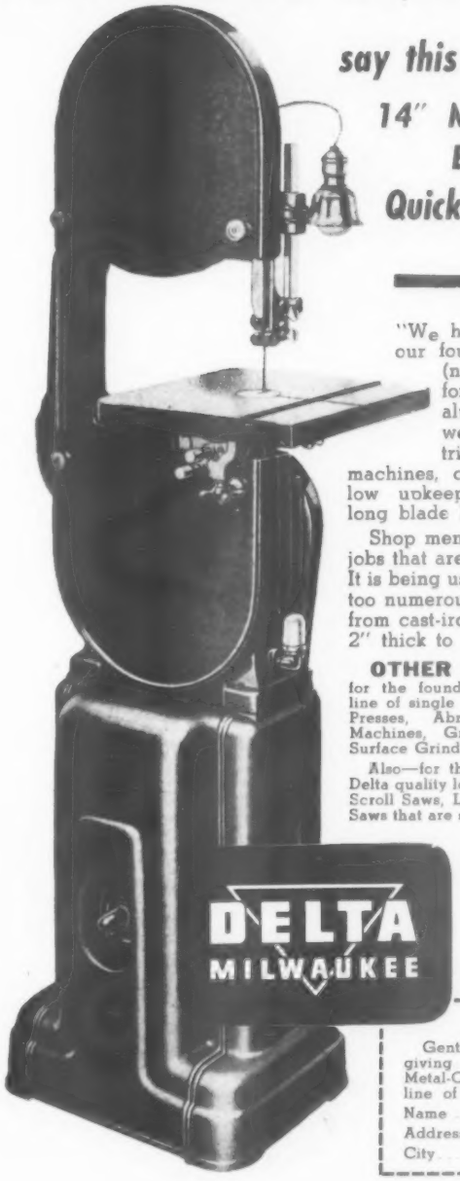
14" METAL-CUTTING BAND SAW

Quickly pays for itself



"We have three of your band saws in our foundry" says one plant manager (name on request). "We use them for sawing gates on our brass and aluminum castings. We figure that we save at least 60% on our trimming costs by the use of these machines, cut to their low first cost, their low upkeep, their small blade cost and long blade life.

Shop men report an astonishing variety of jobs that are handled by this useful machine. It is being used for cutting countless materials too numerous to mention. It cuts everything from cast-iron jig and fixture bases $1\frac{1}{2}$" and 2" thick to draw die segments 6" thick.

OTHER DELTA MACHINE TOOLS

for the foundry machine shop include a complete line of single and multiple spindle 14" and 17" Drill Presses, Abrasive Finishing Machines, Cut-Off Machines, Grinders, Carbide Tool Grinders and Surface Grinders.

Also—for the pattern shop—there is a full line of Delta quality low-cost Circular Saws, Jointers, Shapers, Scroll Saws, Lathes, Sanders and Wood-Cutting Band Saws that are stepping up pattern shop output in many hundreds of shops from coast to coast.

SEND FOR CATALOG

giving full details and prices on the Delta 14" Metal Cutting Band Saw—and the complete line of low-cost Delta machines for foundry, machine shops and pattern shops. Get in touch with nearest Delta Industrial Distributor or send coupon below.

THE DELTA MANUFACTURING CO.
622-C E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please send me latest Delta Catalog giving full details and prices on the Delta 14" Metal-Cutting Band Saw—as well as complete line of Delta metal and woodworking machines.

Name .....

Address .....

City ..... State .....

In general, high purity of concentrated sulphuric acid was found to be most successful as a solvent.

Although the quantity of quinalizarin needed for this method is quite small—in fact so small that one gram will make several thousand determinations—the material is not now being manufactured and there is only a limited supply available. War Production Board officials working on the problem report that the manufacturer will make sufficient supplies available in the near future for determination by this method.

In general, end results as obtained by the colorimetric method are comparable in accuracy to those obtained by the distillation-titration method. The advantage of the process is that under normal laboratory conditions and with the average laboratory technician, 18 determinations in one 8-hour turn have been made consistently by at least one company.

Demonstration of this method was presented by G. A. Rudolph, Youngstown Sheet & Tube Co., Youngstown, O. Work done in the laboratory of the Jones & Laughlin Steel Corp. was presented by Dick Lewis, who stated that consistent accuracy of the order of plus or minus 0.0002 per cent boron can be obtained when using the process.

Technique for determining quantity graphic analysis was presented by P. R. Irish, Bethlehem Steel Co. Work done at the National Bureau of Standards on spectrographic analysis was outlined by Bourdon Scribner, while the research work done at the University of Pittsburgh using the spectrographic method was described by J. A. Berger, research fellow for the Molybdenum Corp. of America.

The Kettle is Always on
MAY WE SERVE YOU?
The tea kettle is always bubbling over a seal-oil lamp in the Eskimo's igloo. It's a matter of necessity and a sign of friendship. Our kettle of nine strategic service offices is always equally alert to pay personal attention to your business problems.
Ferro-alloys, pig iron, shot, grit, coal and coke . . . the service and distribution of these products has been the primary concern of our organization for over 50 years.
We like to feel that the experience gained over these years has specialized our recommendations to a point where we have one of the better kettles.
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Aging Castings

(*Concluded from page* 134)

ment. Temperatures employed may range from 200 to 500 degrees Fahr., and the time from 2 to 20 hours, depending upon the composition of the alloy, and the physical properties desired.

The Quality Aluminum Casting Co., Waukesha, Wis., specializing in the production of aluminum castings only, has made an intensive study of heat treatment and aging of those over a period of years since castings subjected to those treatments have properties greatly superior to untreated ones. With the knowledge gained by many years of experience, A. G. Harter, foundry manager, states that the firm is able to advise its customers the most suitable aluminum alloy to meet the service requirements for various applications.

Heat treatment or aging may be accomplished in several ways, but the quality foundry finds that gas-fired furnace gives excellent results. The furnace supplied by the Despatch Oven Co., Minneapolis, is the recirculating type as shown in the accompanying illustration with the combustion unit mounted on top of the unit. Castings made by the firm range in weight from a few pounds up to 800 pounds, and are made for a wide range of applications in various industrial fields.

Approves Standards

American Standards Association, New York, has issued its standard for Manhole Frames and Covers for Subsurface Structures under designation A35.1-1941. Cost of the standard is 35 cents. The association also has approved standards for Alloy-steel castings for Structural Purposes (A.S.T.M. A148-42) under designation G52.1-1943; Alloy-steel castings for Valves, Flanges and Fittings for Service at Temperatures from 750 to 1100 degrees Fahr. (A.S.T.M. A157-41) under designation G36.1-1942; Carbon-steel Castings for Miscellaneous Industrial Uses (A.S.T.M. A277-42) under designation G50.1-1943, and Carbon-steel Castings Suitable for Fusion Welding for Miscellaneous Industrial Uses (A.S.T.M. A215-41) under designation G51.1-1943.

LUMBER FOR PATTERNMAKER

And Foundryman

By E. T. KINDT
President
Kindt-Collins Co., Cleveland

FIRST is the question — "what is wood?" The chemical composition of wood is about 60 per cent cellulose, 28 per cent lignin, with minor quantities of other materials. Cellulose is colorless and forms the framework of the cell wall. The cells are similar to straw in minute form. Lignin is the cementing material that binds the cellulose together and is also mixed with cellulose in the cell wall proper. Color, odor and natural resistance to decay are credited to the approximate 2 per cent of the materials other than cellulose or lignin. Wood is, perhaps, the most misunderstood of the major materials that are used in pattern shops, and we are going to attempt to explain in a very brief manner a few things that every patternmaker and foundryman should know.

There are three species of pine, namely, northern white pine (*Pinus Strobus*), Idaho white pine (*Pinus Monticola*) and sugar pine (*Pinus Lambertiana*). All of these are soft woods and frequently called conifers, because virtually all three species bear cones and their leaves are needle-like. These three species are today being universally used for building patterns and flasks.

Three Species of Pine

Northern white pine, originally known just as white pine, is found principally in the lake states and northeastern states and the Appalachian region. The wood is moderately light in weight, approximately 2100 pounds per thousand (M) board feet, moderately low in strength, and usually straight-grained. The soft, uniform texture of the virgin growth has won for it extensive use in building fine patterns. It changes dimensions little with changes in moisture content and is easily worked. The species makes a most desirable wood for patterns and flasks. Virgin growth is becoming rather scarce.

Sugar pine is a native of California and southern Oregon. It is similar in appearance and properties to northern white pine, but usually can be distinguished by its conspicuous resin ducts. It is somewhat softer than northern white pine, and will not carve as smoothly with hand tools, especially on end grain, as the northern pine. The finest quality of sugar pine is produced in the high altitudes of California.

Idaho pine is grown principally in northern Idaho, eastern Washington and western Montana. This species of pine resembles the northern white pine very closely. It is a trifle harder, a little more difficult to work, and is somewhat heavier, approximately 2300 pounds per M board feet. It will swell and shrink a little more with changes in moisture content than northern white pine.

With reference to hardwood lumber for patternmakers, mahogany holds the upper hand. There are three distinct species, namely, the Central American, Mexican, and Peruvian. The Central American and Mexican mahogany are almost identical in texture, weight and hardness. Peruvian mahogany is somewhat closer-grained, harder, and weighs more than the other two mentioned, 3800 pounds per M board feet. All of the three species respond about the same so far as shrinking and swelling go in various humidities.

Next let us consider seasoning of lumber. We are a firm believer in the water

Steel the primary war metal is made faster with . . .

MOORE RAPID Lectromelt FURNACES

●Hundreds of Lectromelt Furnaces are pouring steel 24 hours per day to meet today's demands for war equipment. Flexibility, rapidity and economy of operation are a few of their distinguishing features. Top charge type Lectromelts result in greater production, lower power consumption, savings in electrode and refractory costs, and increased tonnage per man hour. They are ruggedly built for maximum production and long life.

Top charge type Lectromelt Furnaces are built in standard sizes ranging from 100 tons down to 250 pounds capacity. Write for complete details.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNSYLVANIA

curing of logs. When the trees are felled, they are cut into lengths and then the logs are dropped into water where they remain for anywhere from 1 to 2 years. This process of letting the logs lay in the water for long periods will extract resinous material and also tends to cure the wood while still in the logs. Lumber cut from water-cured logs will be more mellow, has a tendency to relieve strains, and will dry a lot faster after once cut into lumber.

In our early experience, we can remember very distinctly that a number of the large northern white pine mills took pride in saying that all their logs were water-cured, and we have seen several years' cut of logs that were waiting to be cut up into lumber. Today, this water-curing still exists, but the logs are not left in the water nearly as long.

After lumber is cut it is taken out into the yard and put into piles with strips in between each layer, or tier. The strips are evenly placed approximately four feet apart and care is taken so that each strip is exactly on top of the one that is under it, in order that the board will have the perfect support.

Most of the high grade mills protect their thinner lumber, say 3-inch and 4-inch, by boxing it so as to retard the flow of air. This prevents checking. If this were not done it would be quite possible that the outside of thick lumber would dry too fast over the wet core. It requires about one year to every inch in thickness, to bring lumber down to the moisture content of the average humidity surrounding it.

The average moisture content of a thoroughly seasoned piece of white pine is anywhere from 10 to 14 per cent, depending upon the locality in which the seasoning takes place.

For patternmakers to use air-dried lumber with any degree of satisfaction, it would be necessary to take lumber into the shop and again pile it on strippers and leave it to acclimate anywhere from 6 months to 2 years, the length of time depending upon the thickness of the lumber. Care also would have to be taken that any lumber so piled in the pattern shop would be ventilated properly. This method of acclimation would be perhaps the most ideal under the average shop conditions but may be difficult to attain.

Lumber Is Kiln Dried

Most of the pattern lumber that is used today has been kiln-dried. With the modern kilns it is possible to extract the moisture from lumber down to 6 or 7 per cent moisture content in a fairly satisfactory manner. When lumber is put through the kiln it shrinks in measurement from 3 to 5 per cent, depending upon the moisture content of the lumber when it enters the kiln. Lumber will also degrade 3 per cent or more as kiln-drying brings out certain imperfections that cannot be seen in the air-dried lumber.

While preparing lumber in the modern kiln gives the workman dry lumber, we do not believe that this is yet the final answer to the many discrepancies to accurate pattern work. We will come back to this subject a little later.

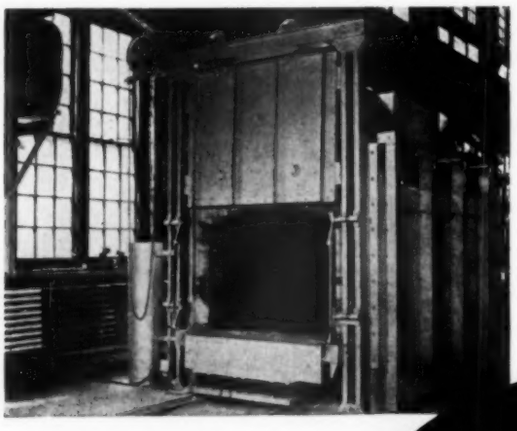
A grade of a board is based on the number, character and location of such defects as knots, mineral streaks, pitch pockets, rot, sometimes called doze checks, shake and stain. Most of these defects are a natural part of the tree. The various imperfections mentioned do not prevent the use of such lumber from giving entire satisfaction when used for the proper purpose.

While time does not permit us to go too deeply into the matter of grading lumber, however, we wish to give sufficient information for those who are interested so that they can get grading rules for both the soft woods and hardwoods.

Sugar pine and Idaho pine come directly under the standard grading rules

VULCAN FURNACES

Direct or Convection Fired . . . Designed for Quick Heating With Absolute Uniformity

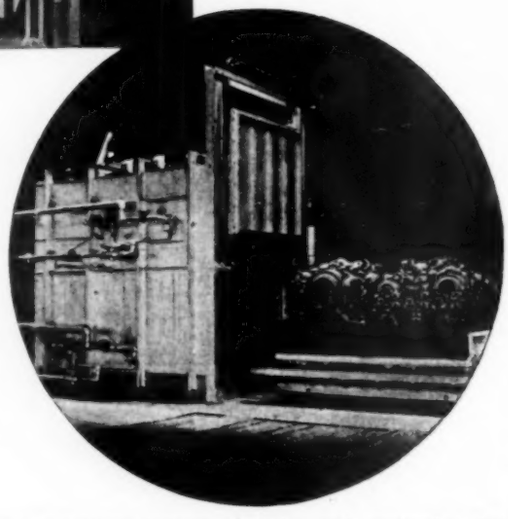


VULCAN Convection Type Car Hearth Furnace . . .

For all tempering or stress relief requirements from 450° to 1300° F. Equipped with motorized car and door; automatic program temperature control; and furnace pressure control. Can be furnished oil or gas fired or electrically heated.

VULCAN Direct Fired Car Hearth Furnace . . .

For all annealing, normalizing and heat treating operations. Temperature range, 650° F. to 2000° F. Piers on car can be arranged for quenching with peels or crane grabs. Completely equipped with motorized car and door; automatic program temperature control; and furnace pressure control. Oil, gas or electric.



VULCAN furnaces incorporate features of design and construction that substantially reduce time and costs for all heat treating and heating operations. Consult our engineering department regarding your requirements.

VULCAN CORPORATION
1797 CHERRY STREET, PHILADELPHIA, PA.

as published by the Western Pine Association which is the administrative agency of lumber code authority in the western pine division. Its address is Portland, Ore. In its book of rules it says:

"The purpose of grades is to maintain a standard of measure of value between mills manufacturing the same or similar woods, by harmonizing the natural differences existing between the different stocks of lumber regardless of the character of the logs from which they are produced, regardless of the mill from which it comes. Uniform grades also provide both buyers and sellers of lumber with a measure by which each can determine whether he is buying or selling full value."

We refer those using northern white pine to the Northern Pine Manufacturers Association, Minneapolis, which also issues book on grading rules. These rules differ slightly from the Western Pine Association.

All mahogany comes under rules of the National Hardwood Lumber Association, whose address is 2408 Buckingham building, Chicago. Hardwood grading rules differ greatly from the pine rules. In pine rules, we maintain that there are nine grades suitable for pattern work, and two grades that are suitable for foundry flask and slip jacket work.

Lumber In Many Grades

In both sugar pine and Idaho white pine, which comes under the Western Pine Association grading rules, our recommendation is that grades from *F. A. S. Clear* all the way down to the *No. 2 Common and Better* have a distinct place in the pattern shop, as do the northern pine grades from the *B. & Better down* to the *No. 2 Common.*

For foundry work, in the northern white pine grades, we recommend the *No. 2* and *No. 3 Common* for flasks, depending entirely upon the size and service required from the particular flask and slip jackets to be built.

In the mahogany field there are five grades that cover the entire field.

It is urged that the foundryman and patternmaker keep in mind that the human element enters into the grading of lumber. Each grade has its respective low and high line boards. Certain tolerances must be accepted.

Our observation, over a period of years, has been that during times of depression and lower labor costs, cheaper and lower grades of lumber are demanded for higher pattern and foundry work. The demand for higher grades increases with labor costs and more prosperous times.

Five of the most common reasons for complaints enumerated in respective order are:

(1) Not the grade ordered, or expected.
(2) Lumber not sufficiently dry.
(3) Lumber too prone to twisting, warping or splitting.
(4) Too much narrow stock.
(5) Lumber too cross-grained or too hard textured, or too much pitch.

There is no question in our mind that each user has had complaints as enumerated, perhaps many times. No grading rules cover complaints listed in 2, 3 and 5. Here we might mention that too often pattern and flask lumber are bought strictly on price. There are a number of very fine concerns specializing in pattern and flask lumber, and they can give the user, without question, the most satisfactory material dollar for dollar over any period of time.

The purchaser of off-grade lumber has the recourse of applying to any one of the three lumber associations as mentioned before for a re-inspection of grade. The expense of re-grading is borne by the buyer if the grade is found to be correct. If more than 4 per cent in hardwood, and more than 5 per cent in pine, is off-grade, the shipment can be returned and all expense is borne by the seller.

To measure lumber properly one must do so with a standard lumber rule so graduated that it calculates the number

CITIES SERVICE
DELCO FOUNDRY
PRODUCTS
FOR ALL USES

CITIES SERVICE OILS
ONCE-ALWAYS

Untouched photograph of Green Core for a Universal Lathe Head for R. K. Le Blond Machine Tool Co., Cincinnati, O., manufactured by Keuthan Foundry Co., Middletown, O., users of Cities Service Delco Core Oil #4 (1½ gals. to 400 lbs. of lake sand). To insure added corner strength Cities Service Delco Core Oil #4 has been applied after core has been removed from box.

5 REASONS FOR
USING CITIES SERVICE DELCO FOUNDRY PRODUCTS

First: The very complete line of core oils manufactured for the many exacting uses.

Second: Uniformity of each shipment. Once an oil has been used for a certain operation, the foundry can depend that each delivery will run uniform; this point cannot be stressed too strongly.

Third: Only the cleanest of ingredients are used in the manufacture of Cities Service Delco Core Oils. This means less smoke, better working conditions in the boxes, etc.

Fourth: The oils are made with consideration of their application, whether they are to be used for Gray Iron, Malleable, Steel, Semi-Steel, Bronze, Brass, Magnesium or Aluminum.

Fifth: It is our policy to maintain the highest standard of quality in the manufacture of Cities Service Delco Core Oils, and not substitute inferior ingredients to secure lower cost.

CITIES SERVICE OIL COMPANY

OFFICES IN CHICAGO, CLEVELAND, DETROIT, ST. PAUL, CEDAR RAPIDS, KANSAS CITY, TULSA, FORT WORTH, SHREVEPORT, MILWAUKEE, TORONTO, NEW YORK

of surface board feet in any length piece. Surface measure means the contents of a board on the surface. Boards are measured in thickness by quarters. One-inch is called 4/4, 1¼-inch is called 5/4 and 2-inch, 8/4, etc. When the lumber shows 16 feet surface and the lumber is 1-inch thick, or 4/4, there would be 16 feet of lumber in the board. If the lumber is 2-inch thick, or 8/4, one doubles the surface measurement of 16 feet or 32 feet contained in the 2-inch board. Remember less than 1-inch thick is always measured as 1-inch. Quoting from one of the grading rule books regarding measurements:

> "A material measured with a board rule on actual widths, pieces measured to the even half foot shall be alternately counted as of the next higher and lower foot count. Fractions below the half foot shall be dropped and fractions above counted as of the next higher foot.
>
> "Because of the variable human element in the application and use of a board rule, a difference of not to exceed 1½ per cent shall be considered a reasonable variation between tallies."

The subject of shrinkage and expansion is rather technical, but of vital interest. The word "bone-dry lumber" often is used, yet really means nothing to a patternmaker. Tremendous amounts of money are wasted annually on correcting wood patterns. Besides, a great deal of metal is wasted for the reason of patterns swelling out of shape and losing the costly accuracies built into them. Wood naturally shrinks and expands according to atmospheric conditions which surround it.

Air always contains some moisture in the form of vapor and this quantity of moisture is variable from day to day and from one locality to another. When a pattern is exposed to the atmosphere in which the quantity of moisture is variable, it quickly changes in moisture content and shrinks or swells or twists accordingly.

No matter how thoroughly or carefully the lumber may have been dried or seasoned it daily changes its moisture content taking on or giving off moisture to adjust itself to changing atmospheric conditions. Contrary to the general opinion, when wood is air-dried, it finally reaches a moisture content below which it does not go no matter how long it may be seasoned, unless there is a decided change in the atmospheric condition.

Moisture Content Was High

The Forest Products Laboratory of the United States Forest Service, Madison, Wis., is responsible for the statement that a quantity of black walnut, after being air seasoned in an unheated building, but protected from the weather for 60 years, had a moisture content of 11.6 per cent. Over half a century of air seasoning failed to reduce the moisture content of this particular lot of lumber so that one would be able to build patterns from it with any degree of accuracy during the winter months. We believe the reason for that is that in practically all the pattern shops we have ever seen, the relative humidity is too low, especially so when the outside temperatures are below freezing. We personally have tested many shops for relative humidity, and we can say frankly that we have never found two shops which were alike in this respect in the same town on the same day.

Too often, pattern lumber has been condemned as being too wet when actually the lumber has not been at fault, but the outside influence surrounding it. In all of our experience, we have failed ever to hear a patternmaker say "it's the condition of our shop and not the lumber that is giving us the trouble".

During winter months, when windows and doors are closed, and dry, artificial heat is used, pattern shops become extremely dry, often dangerously so. When properly seasoned lumber is brought in

HAUSFELD FURNACES

Hausfeld Tilting Furnaces with Link Belt Conveyor

MOBILIZE INDUSTRY FOR WAR AND PEACE

By increasing production of die castings 60%, this battery of 6 Hausfeld Melting Furnaces has placed the foundry upon a war basis. But these furnaces will outlast the longest war. When the present emergency is past they can be applied to the manufacture of consumer goods. • All moving parts of Hausfeld Furnaces are accurately machined and balanced. Roller bearings reduce friction and make for speed in charging and discharging. Scientific regulation of fuel intake assures perfect combustion, rapid melting, long life of linings and crucibles; reduces contamination of metals.

Hausfeld Melting Furnaces are available in sizes and types for all non-ferrous metals and their alloys. Foundry tested before shipment.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

it actually seems wet, and will shrink.

Only a short time ago following a very cold snap, we had an opportunity to make a thorough check on a large jobbing pattern shop building aircraft engine patterns which was having trouble with lumber and patterns checking and shrinking. We first checked the rough lumber in the lumber rack with an electric moisture content tester and found it to have from 8 to 9 per cent moisture content. We also checked some pine pieces approximately 12 inch square by 5 feet long which had been glued and which showed considerable check.

These pieces registered 7 per cent moisture content on the outside. We also checked several bench tops and found them to be less than 6 per cent. The relative humidity was then checked with a wet and dry bulb checker and found to be 34 per cent which would put lumber in equilibrium with less than 7 per cent moisture content.

We found the relative humidity in the location of the lumber storage rack to be 42 per cent. The trouble with this particular shop, as we figured it, was that the lumber was being brought into the pattern shop from the lumber rack and was drying out too fast on the outside.

Dried Lumber Shrinks

When lumber dries it will shrink. Consequently, checking results. Now what would one expect to happen to wood patterns and coreboxes built accurately and dried out to a 6 per cent moisture content when taken to a foundry and surrounded by wet sand. We do not have to tell you, you know the answer. If the work is very complicated it will require many man hours to again make cores fit and centerlines check. Discrepancies of this sort can be attributed directly to faulty atmospheric conditions in the shop and storage vault.

We often hear patternmakers talking about splitting 1/64-inch on wood patterns when using veneers and occasionally micrometers. A 12-inch flat grained pine board will shrink 1/16-inch when the moisture content is reduced from 12 per cent to 7 per cent. Wood shrinks most in the direction of the annual growth ring tangentially, commonly called flat grain, and about one-half to two-thirds as much across these rings radially, called edge grain. Practically no shrinkage or expansion takes place longitudinally except when a board is excessively cross-grained and lengthwise shrinkage is a combination of crosswise and longitudinal change.

The percentage of moisture content recommended for either pine or mahogany is selected for the purpose of reducing changes in moisture content to a minimum, thereby minimizing dimensional change after the patterns and coreboxes are put into service or stored away.

Our experience has been that the average patternmaker has just paid too little attention to moisture content of lumber and relative humidity in patternshops and storage vaults. A moisture meter for testing lumber and a wet and dry bulb instrument for testing humidity can be bought at a nominal figure. By the proper use of them you will be greatly benefited.

This article is condensed from a paper presented by the author at the annual convention of the American Foundrymen's Association held April 20 to 24, 1942 at Cleveland.

THE EDITORS.

Revises Handbook

National Electric Manufacturers Association, 155 East Forty-fourth street, New York, recently has published a handbook, "Electric Arc Welding Machine and Electrode Standards," No. 42-81 superseding No. 36-37. The handbook is completely revised, the new material covering standards for both d.c. and a.c. arc welders. Standards for rectifier arc welder equipment remain much the same. Standards for electrodes have been segregated and a table for two-color markings for heavy coated ferrous electrode identification has been added.

I'LL SAY THIS ABOUT **MOGUL BINDER..**

it makes good cores that dry out and *shake out.* You don't get green centers."

THE COURT: **Q.** "Tell the court what a green center is.'

COREMAKER: **A.** "The center of the core isn't dried out. *Mogul* gives high green bond value in sharp sand. *Mogul* holds it together. When the core is baking, the sand is open enough to let the gases out. And the core dries all the way through."

THE COURT: **Q.** "Don't the cores stick?"

COREMAKER. **A.** "No, Sir, Judge! You can shake cores out easy if you use *Mogul* and sharp sand."

THE COURT: **Q.** "How about using oil with *Mogul?*"

COREMAKER: **A.** "Sure. *Mogul* has a high hot strength, so no matter if the cores get hot *Mogul* keeps 'em stiff. And let me tell you, judge, you can use *Mogul* as a binder in dry sand and green sand for molds. Castings come out clean because *Mogul* burns out and peels like an onion."

CORN PRODUCTS SALES CO.
17 BATTERY PLACE · NEW YORK CITY

HEAT FUEL OIL BEFORE

Using in Open Hearth Furnace

FUEL oil should be heated before it enters the combustion chamber of an open-hearth furnace. Preheating is a requisite of atomization. Complete combustion is impossible without first breaking up the oil into a fine spray by superheated steam or compressed air. It is possible to heat the oil above the point that gives the desired even flow of the liquid to the burner. But steam or air may be heated as hot as the valves and fittings of the line will stand without causing trouble.

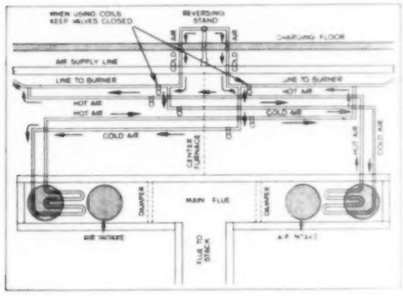
The heavier the oil the higher is the temperature required for satisfactory pumping through the line, and for the proper atomization at the burner. The range seems to be about 200 degress Fahrenheit for very heavy oil, 160 degress Fahrenheit for medium oil, and about 130 degrees Fahrenheit for the lighter oils.

Rotary pumps seem to give better service than the plunger type. With the former no pulsation is noticeable while it is noticeable quite often with the plunger type of pump. Steady flow of the oil stream is important throughout the heat period.

Set up for preheating steam or air is not complicated or expensive. The coils should not be located where they interfere with furnace repairs during a campaign. They should be placed so they can be taken out if necessary and replaced, without interfering with furnace operation.

The atomizing element—steam or air—should pass up to the reversing stand and down again before it enters the coils for preheating. This shortens the passage from the coils to the burner, minimizes loss and evades the objectional feature of leaky control valves which might be caused by the excessive heat.

Assuming that the furnace stands east and west as in the accompanying illustration, the line running from a coil in the west flue will connect with the burner at the east port of the furnace. The line leading from the coil in the east flue will connect with the burner at the west end of the furnace. Thus the coil around which the waste gases are passing at any moment is the one through which the atomizing element is passing.



General diagram (not drawn to scale) of coils in furnace flues for heating air employed as atomizing agent when burning oil fuel in an open-hearth furnace

Where steam is used for atomizing, the coils should be tapped lightly once a month or oftener with a hand hammer to dislodge any accumulation of flue dust that settles on the pipe. The coils placed horizontally in the flue are fully as effective as they are when placed crosswise, and less likely to impede the flow of the gases. Air causes much less dust accumulation than steam, and air coils may be placed in any position de-

METALLURGICAL TESTING *with speed and accuracy*

• Specimen Polisher; vibrationless operation; selective speeds; sturdy construction, with maximum comfort and convenience in operation.

• Bakelite and Transoptic mounts made in AB specimen mount press.

• AB Multiple-Unit polishing table—for industrial production laboratories. Ample room is provided for each operator. May be supplied with either standard or low speed polishers.

• Wide field binocular. Stereoscopic vision from 7X to 40X and up.

• AB Specimen Mount press—with solid heater and new design split cooling blocks that swing into position without releasing pressure on the mold. Built for speed, convenience and accuracy in molding specimens.

A complete line of equipment for the Metallurgical Laboratory

SPECIMEN MOUNT PRESSES — POLISHERS — POLISHING ABRASIVES — POLISHING CLOTHS — POWER GRINDERS — BELT SURFACERS — CUT-OFF MACHINES — HAND GRINDERS — CARBON METERS — COLORIMETERS — HARDNESS TESTERS — DUST COUNTERS — DILATOMETERS — EMERY PAPER GRINDERS — LABORATORY CHAIRS PYROMETERS — MAGNIFIERS — METALLOGRAPHS — MICROSCOPES — STEREOSCOPES TITRATORS — REFRACTOMETERS — SPECTROGRAPHS — MACRO CAMERAS

Adolph I. Buehler

OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS

228 North LaSalle Street, Chicago, Illinois

sired without danger of interfering with the furnace operation throughout a furnace campaign. The small amount of dust which collects on the coils does not seem to interfere with the transfer of heat from the gases to the air.

It is possible with steam to attain a superheat of 900 degrees Fahrenheit and to heat air to 700 degrees and control the elements at these high temperatures without any difficulty. The advantage gained is tremendous, particularly when heavy oil is used. Advantages include hotter flame, shorter heat time, and fuel economy.

With provisions for heating the atomizing air to well above 500 degrees Fahrenheit one furnace has made 750 heats, and is good for many more.

Obituary

(*Concluded from page* 140)

O'Brien of the metallurgical laboratory, Symington-Gould Corp., Depew, N. Y.

° ° °

Winchester C. Packard, 50, assistant sales manager and treasurer, National Enginering Co., Chicago, died at West Suburban Hospital, Oak Park, Ill., Feb. 14, of pneumonia. Mr. Packard had been associated with the company 13 years.

° ° °

Gustave R. Fernlund, 51, engineer, Forest City Foundry Co., Cleveland, died recently at his home in Lakewood, O. Mr. Fernlund, a native of Grand Rapids, Mich., was connected with the Superior Foundry, Cleveland, previous to his 5 years' association with the Forest City Foundry Co.

° ° °

Howard M. Raymond, 69, president emeritus, Illinois Institute of Technology, Chicago, died at his home in Grass Lake, Mich., Jan. 24. Mr. Raymond retired as president of Armour Institute of Technology, now Illinois Institute, 10 years ago. Graduating from the University of Michigan in 1893, he joined the Armour Institute faculty in 1895 as an instructor in physics, served as dean of engineering from 1903 to 1922, when he became president.

Prepares Report

"Controlling Factory Production for Fuller Use of Manpower and Machines" is the title of a recent report prepared by the Policyholders Service Bureau, Metropolitan Life Insurance Co., New York. The 34-page report includes information on preliminaries to production control, responsibility for production control, scheduling procedures, dispatching, progress control, and duplicating processes.

Father and Son Aid Same Cause

While young Jim Whyte, touching the 60 year mark, makes patterns for brass castings which the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., converts directly into war equipment and production machinery, his father David Whyte at 95 puts in a full shift every day as a master mechanic with John Brown & Co., Clydebank, Scotland, building fighting ships for Great Britain. In addition to his daily work in the production of goods designed to defeat the Axis and the Japanese, the younger Whyte allocates 33 per cent of his pay to the purchase of War Savings Bonds. In a recent drive in his vicinity he and his wife contributed 300 pounds of scrap.

Adds Representative

Carl F. Miller & Co. Inc., 1217 Sixth Avenue South, Seattle, has been appointed representative in the states of Washington, Idaho, Western Montana, and the province of British Columbia for the Cleveland Quarries Co., Cleveland, in the sale of its silica firestone.

WITH THE RYAN ELECTRIC DOOR LIFT
AND AUTOMATIC CONTROL

The above illustration is typical of the war production jobs which Ryan Electric Door Lifts and Automatic Controls are doing. In this plant — as in scores of other vital heat-treating industries — the Ryan Electric Door Lifts and Handling Equipment enable 1 man to handle the work formerly done by 4.

Charging and discharging operations are performed with precise timing, minimum heat losses, and maximum quality in the finished product.

Ryan Lifts and Controls are installed in a few hours on either new or old installations. A new complete technical Bulletin forwarded on request.

Conserve time . . . . CONSULT RYAN!

ENGINEERED FJR EQUIPMENT

FRED J. RYAN COMPANY
LOCATED IN A PHILA. SUBURB . . . WYNCOTE, PA.

Conducting Accurate Test on

ABRASIVE PERFORMANCE

METALLIC shot or grit, used as the abrasive in blast machines for the cleaning and finishing of metal parts, is becoming increasingly difficult to obtain even with high priority ratings due to the scarcity of scrap steel and other alloy components.

With almost every blast cleaning machine operating on a 24-hour daily schedule, the demands for steel abrasive, are greater than the supply. Therefore, it is necessary to conserve all possible material by using only abrasive of the proper size, material and hardness.

Every manufacturer of blast cleaning equipment, both airless and air blast machines, recommends certain general sizes for a specific use, such as a No. 20 shot for the cleaning of sand from average gray iron castings. Depending upon the condition, density and toughness of the scale or foreign material to be removed and the metallic content of the part to be cleaned, the abrasive recommended may not in all cases, be the best suited for the cleaning job.

When cleaning tests have been made in the manufacturer's demonstration laboratory on customers' products, prior to the purchase of blast cleaning machine, the recommendations given for abrasives to be used are based on performance tests. Those recommendations can be followed by the customer with assurance of obtaining the best performance. This, of course, will hold true only when test conditions remain the same during actual operations.

If an improperly sized abrasive is used, cleaning time for the load is increased, the finish desired on the pieces cannot be maintained, and production is slowed down accordingly. Since that is a definite waste, steps should be taken to find the proper size or type of abrasive to use.

In the case of a plant or a jobbing foundry which is producing a wide range of work, each of which demands a different abrasive, it is wise to know and use only the correct abrasive. After this is determined, either by means of past experiences or by conducting a test such as that described later, it is a simple matter to change to the right abrasives whenever necessary.

Test Performance of Material

Accurate abrasive performance tests can be conducted under actual operating conditions by firms interested in discovering whether their blast cleaning equipment is operating efficiently and economically with the abrasive used. Besides determining the correct size and type abrasive to use for particular cleaning applications, the test may also be made for comparing the merits of competitive brands of abrasive within the same size range.

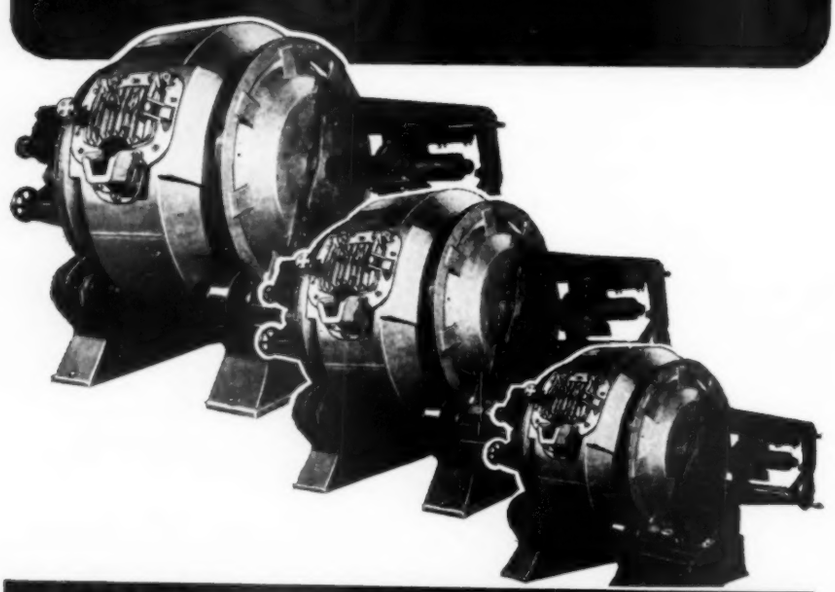
The following test can be applied to any airless blast cleaning equipment, such as Wheelabrator machines. However, allowances should be made for additional blasting wheels if a special cabinet or multi-wheeled machines is used for the test:

1. The machine to be used should be cleaned thoroughly to remove all abrasive.
2. Put a weighed amount of the required abrasive into the machine.
3. The abrasive blast wheel should be new, all parts accurately weighed and marked for identification.
4. End guards, both right and left, the horizontal guard and the curved liner over the wheel should be weighed.
5. Record in a daily log the following information for the specified test period:
   A. Type of work cleaned.
      a. Material

THERE'S A DETROIT ELECTRIC FURNACE BUILT TO FIT YOUR FOUNDRY NEEDS

The Detroit Furnace is recognized in many jobbing and production foundries as an indispensable, metallurgical, production tool. It melts ferrous or non-ferrous metals and alloys with amazing speed under very precise control. Because of its speed and versatility, the Detroit Rocking Electric Furnace gives a higher rate of production of a better average quality of product at lower net cost.

From 10 to 8,000 lbs. per heat, there's a "Detroit" to fit your needs. Write today for complete facts about these efficient furnaces.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY · BAY CITY MICHIGAN

b. Weight
c. Shape

B. Number of loads and cleaning time and weight

C. Actual hours of wheel time with abrasive flowing.

D. Loading and unloading time should be segregated, as no abrasive wear occurs during this time.

E. Record the amount and time when new abrasive is added.

6. Take a sample of the abrasive from the feed spout every 4 hours and keep these samples in bags properly labeled as to the time the sample was taken. These are to be used later to show abrasive breakdown.

7. At the end of the run clean the machine.

A. Weight abrasive remaining.

B. Weigh blades, guards, liners.

8. Repeat the above steps for each abrasive tested.

9. The ventilation must be the same during all tests.

To determine the relative efficiencies of the abrasives tested, the following elements should be checked.

1. Abrasive Breakdown:

Analyze by screening, if possible, the samples taken at the 4-hour intervals. Note the condition of the abrasive as to the quantity of usable material remaining in each sample.

2. Cleaning Efficiency

Time required to clean identical loads of work. There must be a fair appraisal of the degree of cleaning of the parts. That is, all work must be cleaned to the same extent, otherwise there will be no just basis of comparison.

If one abrasive will clean faster than another, it must be assumed, all other factors being equal, that it is the more efficient abrasive.

However, cleaning efficiency must be matched with abrasive breakdown to obtain the true merit of the product.

If breakdown is excessive, even though cleaning qualities are excellent it is not only false economy to continue to use the faster cleaning abrasive but it also results in a waste of costly abrasive. The most economical abrasive to use in any blast cleaning machine is that which combines long life with high cleaning efficiency.

Casts Hand Tools

New heat treating process by which it is claimed malleable iron castings or select portions of them can be converted to metal having the characteristics of hardened steel, has been acquired by General Finance Corp., 184 West Lake street, Chicago, through purchase of stock of Bi-Metallic Products Corp., 1760 Diversey Boulevard, Chicago, according to Owen L. Coon, chairman of the board of the former company. Frank G. Buffum, who developed the process, has been elected vice president of the subsidiary company. L. H. Erickson, president, Borg-Erickson Corp., Chicago, is president.

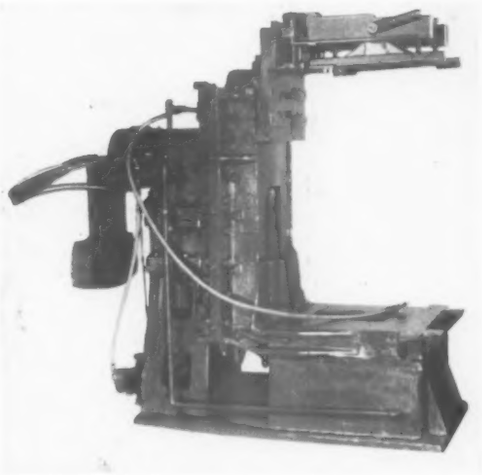
The company's output is being utilized in the manufacture of small hand tools. Among advantages claimed for the process are that products and parts can be cast to shape prior to heat treatment, eliminating more costly fabrication operations; machining costs are lower than with hardened steel; and over all costs are less than by fabrication by other methods.

Awards "E" Flag to Equipment Concern

Army-Navy "E" was awarded to the Mathews Conveyer Co., Ellwod City, Pa., at ceremonies at the plant, Jan. 12. The award was presented by Brig. Gen. William C. Kabrich, chief, technical division, chemical warfare service, Edgewood Arsenal, and was accepted by F. E. Moore, president of the Mathews company. Presentation of Army-Navy "E" pins to the employes was by Commander W. W. Slocum, of the United States Navy.

GRIMES
MOLDING MACHINES

HAND AND POWER ROLL-OVERS
FOR CORE ROOM AND FOUNDRY



1000 lb. Capacity Jolt Roll-Over
22″ Pattern Draw

COMPLETE CORE SAND
MIXING UNITS

WITH AUTOMATIC PROPORTIONING
OF INGREDIENTS, ENGINEERED,
FURNISHED AND INSTALLED

We are ready at any time to consult with you — WRITE or WIRE...

GRIMES MOLDING MACHINE SALES
1429 VIRGINIA PARK DETROIT, MICHIGAN

DOWN-GRADING NONFERROUS CASTINGS

(*Concluded from page 87*)

secondary sources such as sweated or unsweated radiator cores. Lead is generally the contamination of our secondary supply that restricts the use of material in our tighter specifications. Such in general, are the considerations governing our source of supply of material to make the various grades of brass and bronze castings.

The designer, in the past, has given little or no thought to conservation but has specified the best material for the purpose intended. Composition *G*, or gun metal, has many important and traditional uses. In peace times when the supply of raw materials was unrestricted there could be little criticism of a designer who specified that excellent metal for many and varied uses. However, today the 0.2 or 0.3 per cent lead maximum in specifications for that bronze places it in a class requiring primary copper and tin for its manufacture. Now the designer must revise his thinking and specify the least restrictive material that will do the work at hand.

As indicated on the chart, in many instances composition *M*, or even 85-5-5-5 will give adequate service performances for many items where composition *G* has been specified. The armed services are recognizing this and have made many specification changes of this nature which conserve primary metal. The Navy, last spring issued a directive permitting the use of composition *M* in place of composition *G* in pressure castings. The Maritime Commission has changed propeller shaft sleeves from G to *M*, an alloy on which the Navy had standardized for the purpose.

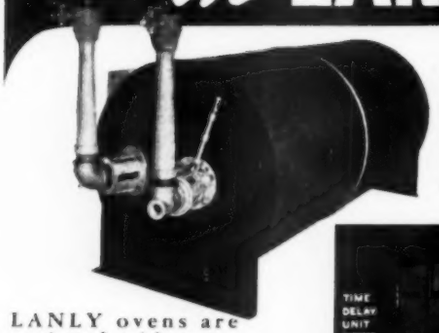
More recently the Navy has pointed out the possibilities of the use of 85-5-5-5 for composition *M*, composition *G* or silicon bronze for sea water valves and fittings. It might also be noted that where structural strength is the primary consideration leaded manganese bronze is an excellent design choice, in place of composition *G*, silicon bronze or aluminum bronze.

There are times when a partial or full substitution of ferrous metal may be made for some of the nonferrous alloys—even in some uses directly or indirectly connected with our war effort. For instance, such is the current use of malleable iron tail-pieces for fire hose couplings that formerly were made of the underwriters mixture. Swivels, and couplings used aboard ship, are retained in a nonferrous metal. The alloy used, is a common leaded yellow brass that can be made entirely from secondary material and scrap.

Other possible design changes are shown on the chart and those which are currently most desirable are indicated by the use of heavier connecting lines. Results to date have been encouraging. Much progress has been made. The actual saving in primary copper by specification changes already is measured. Much more still remains to be done. It is work in which all who are connected with the war effort can co-operate.

Ingot makers, foundrymen and others who have direct knowledge of items where changes can be made to conserve critical materials should bring them to the attention of those responsible for the specifications involved. Specific recommendations should be made. In this the Conservation Division of the War Production Board will gladly be of assistance. But it is primarily a challenge to the design engineer to see that by a closer examination of end use he secures the best possible utilization of our material resources to win the war.

3 factors of efficiency in LANLY OVENS



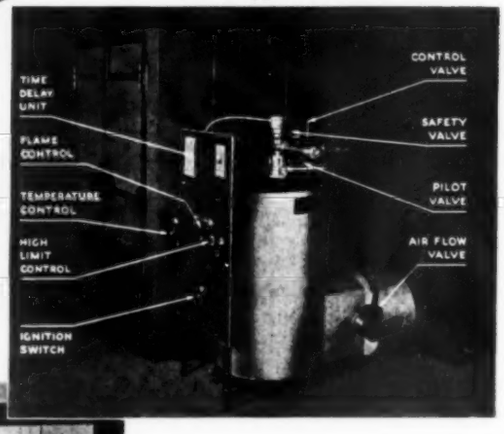
1 The LANLY Direct-Fired AIR HEATER is of the atmospheric pull-through type, designed for heating fresh air and re-circulated air.

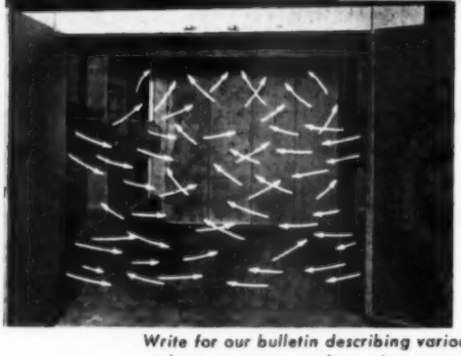
This compact, well insulated heater is highly efficient and versatile in its application to various types of ovens.

LANLY ovens are equipped with every known scientific device to assure economy of fuel consumption, accurate control of all functions and safety under all conditions.

The high efficiency and practically foolproof operation obtained have been important factors in bringing many repeat orders.

2





3 The LANLY Balanced AIR SYSTEM handles heated fresh air and re-circulated air.

Air entering from both sides intermingles and spreads throughout the oven, maintaining remarkable uniformity of temperature.

Large or small cores bake uniformly regardless of their position in the oven.

Write for our bulletin describing various types of ovens available and request a proposal covering any specific needs you may have.

THE LANLY CO.
OVENS FOR INDUSTRY
750 PROSPECT AVE. CLEVELAND, OHIO

A.F.A. PLANS ST. LOUIS CONFERENCE

(*Continued from page 86*)

ing group of malleable melting experts are preparing the material for this symposium. In addition, the Malleable Division will hold a round table meeting at which there will be "off-the-record" discussions of special war problems in connection with malleable castings production.

The Steel Division under the chairmanship of C. E. Sims, Battelle Memorial Institute, Columbus, Ohio, with the program committee under the chairmanship of T. N. Armstrong, International Nickel Co., New York, is sponsoring some three sessions of papers as follows: Cores for Steel Castings; Report of Committee on Radiography; Quantity Production of Manganese Steel; Use of Aluminum in 1000 Steel Heats; Converter Practice; Report of Committee on Non-Destructive Testing; Porosity and Bleeding of Ferrous Castings, and Report of Committee on Heat Treatment of Steel Castings. The Steel Division round table luncheon is under the chairmanship of T. D. West, Deere & Co., Moline, Ill.

Will Present Shop Course

The Gray Iron Division under the chairmanship of F. J. Walls, International Nickel Co., Detroit, Michigan, who is also chairman of the program committee, is sponsoring a three session shop course, which will deal largely with cupola operation, the discussion leaders of these sessions being members of the Cupola Research Committee.

A most unusual series of meetings on gray cast iron as an engineering material is being developed under the chairmanship of R. G. McElwee, Vanadium Corp. of America. This series of meetings is arranged to present information on the latest specifications and testing methods with information presented showing the many possible applications of various types of iron castings.

The subject of papers for other sessions of this division are as follows: Cement Molding Practice in a Gray Iron Shop; Core Blowing; Application of Modern Controlled Methods to Produce Heavy Gray Iron Castings; Welding of cast iron; Heat Treatment of Cast Iron for Oil Field Equipment; Cupola Combustion, and Carbon Control in Cupola Melting.

The Brass and Bronze Division of the association under the chairmanship of W. Romanoff, H. Kramer & Co., Chicago has provided for a round table discussion and two technical sessions papers on Recommended Practices for Manganese Bronze, Castability of Manganese Bronze, Recommended Practices for Aluminum Bronze, Recommended Practices for Silicon Bronze, Centrifugal Castings of Brass and Bronze.

The Patternmaking Division under the chairmanship of Vaughan Reid, City Pattern Works, Detroit and Vice Chairman Frank Cech, Cleveland Trade School, Cleveland, has provided for discussion of the following: "Insurance Protection of Patterns," and "Job Analysis and Predetermining of Time Values for Patternmaking."

The association's committees on apprentice and foreman training will take up special problems of training under war conditions. The program for the Foreman Training Committee under the chairmanship of W. G. Conner of the Walworth Co., Washington Park, St. Clair County, Illinois, will be a dinner meeting followed by a round table discussion. The Apprentice Training Committee under the chairmanship of J. G. Goldie, Cleveland Trade School, Cleveland, through its program committee under the chairmanship of C. J. Freund, University of Detroit, Detroit, will have for its session two outstanding speakers, Richard Falk, Falk Corp., Milwaukee,

Speed Your Production with

SCHUNDLER BENTONITE

HERE'S why you can speed your production with Schundler Bentonite: (1) less sand is required, (2) castings are cleaner, (3) castings are more uniform and (4) there are fewer rejections. Moreover, Schundler Bentonite is always sold with a technical service fitted to your requirements.

The supply of Bentonite is ample. Prompt shipments can be made without priority ratings.

24 Hour Service

TO MOST FOUNDRY CENTERS

Akron, Ohio	H. S. Stoller	Milwaukee, Wis.	Thomas H. Gregg
Birmingham, Ala.	Foundry Service Co.	Minneapolis, Minn.	Smith-Sharpe Co.
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Houston, Texas	Barada & Page, Inc.	Tulsa, Okla.	Barada & Page Supply Co.
Kansas City, Mo.	Barada & Page, Inc.	Vancouver, B. C.	Fleck Bros. Limited
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520 RAILROAD STREET • JOLIET, ILLINOIS

and W. J. Hebard, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Special problems of the foundry industry in connection with the war problems of safety and hygiene will be discussed in a round table meeting under the chairmanship of James R. Allan, International Harvester Co., Chicago.

The Committee on Foundry Refractories under the chairmanship of J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala., conducts its technical sessions discussing conservation of foundry refractories.

The Plant and Plant Equipment session will be under the chairmanship of James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind. Three subjects will be discussed and include: Infra Red Lamp Drying of Cores and Molds; Core Sand Reclamation Methods, and Foundry Maintenance Under Wartime Conditions.

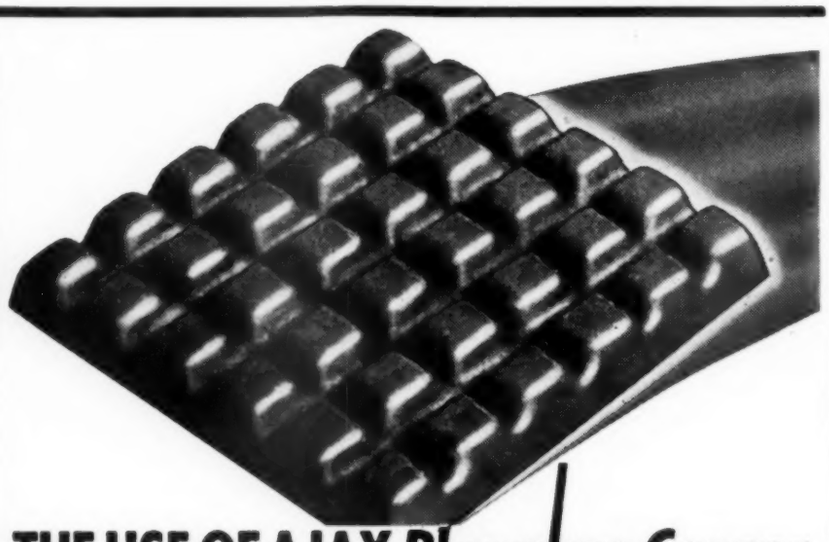
The St. Louis Chapter of A.F.A. which will be host at the meeting has completed appointment of members of the various committees on arrangements and these include:

General committee: Chairman, Louis J. Desparois, Pickands, Mather & Co.; Vice Chairman, Webb L. Kammerer, Midvale Mining & Mfg. Co.; Secretary-Treasurer, John H. Williamson, M. A. Bell Co.; E. Eugene Ballard, National Bearing Metals Co.; C. R. Culling, Carondelet Foundry Co.; R. K. Durkan, M. W. Warren Coke Co.; Lloyd C. Farquhar, American Steel Foundries; E. A. Goerger, City Pattern & Model Co.; H. Goodwin, Medart Co.; K. L. Green Jr., Green Foundry Co.; Ralph M. Hill Jr., East St. Louis Castings Co.; W. E. Illig, Banner Iron Works; R. A. Jacobsen, Carondelet Foundry Co.; J. W. Kelin, Federated Metals Division; George W. Mitsch, American Car & Foundry Co.; Carl H. Morken, Carondelet Foundry Co.; A. O. Nilles, Griffin Wheel Co.; Francis T. O'Hare, Central Brass & Aluminum Foundry Co.; Fred B. Riggan, Key Co.; James A. Roland, Fry-Fulton Lumber Co.; Thomas H. Ross, David Ranken Jr. School of Mechanical Trades; Walter A. Zeis, Midwest Foundry Supply Co.

Hotel committee: Chairman, E. Eugene Ballard, National Bearing Metals Co.; Vice Chairman, Walter A. Zeis, Midwest Foundry Supply Co.; Secretary, Fred Rein, St. Louis Convention Bureau.

Reception committee: Chairman, Lloyd C. Farquhar, American Steel Foundries; Vice Chairman, R. K. Durkan, M. W. Warren Coke Co.; E. J. AuBuchon, M. A. Bell Co.; Henry F. Becker, National Bearing Metals Corp.; M. A. Bell, M. A. Bell Co.; J. R. Bodine, Bodine Pattern & Foundry Co.; C. H. Burnap, American Air Filter Co.; Charles Y. Clayton, Missouri School of Mines; W. G. Conner Jr., Walworth Co.; Charles A. Fitz-Gerald, Sloss-Sheffield Steel & Iron Co.; C. S. French, Semi-Steel Casting Co.; James F. Gilbert, Gilbert Brass Foundry Co.; B. P. Glover, M. A. Bell Co.; T. C. Hamlin, United States Radiator Co.; Herman A. Harte, Fulton Iron Works Co.; George B. Hayes, Eastern Clay Products Co.; L. C. Hewitt, Laclede Christy Clay Products Co.; A. E. Hilliard, M. A. Bell Co.; H. E. Hostetter, Climax-Molybdenum Co.; J. H. Johnston, General Steel Casting Co., Armor Plant; Samuel I. Lefton, B. Lefton & Sons Iron & Metal Co.; M. E. Meyerson, St. Louis Testing Laboratory Inc.; C. W. C. Page, Koppers United Co.; Norman H. Persons, Miller & Co.; James A. Roland, Fry-Fulton Lumber Co.; Charles E. Rothweiler, Hickman, Williams & Co.; O. E. Steep, Sterling Wheelbarrow Co.; F. P. Walsh, Whiting Corp.; Eric H. Warmber, U. S. Graphite Co.

Banquet committee: Chairman, Luther Kleber, General Steel Castings Co.; Vice Chairman, K. L. Green Jr., Green Foundry Co.; Carl A. Binder, St. Louis Steel Casting Co.; F. W. Burgerdorfer, Missouri Pattern Works; R. G. Cadwell, Spuck Iron & Foundry Co.; Oliver Chapman, American Steel Foundries; Charles M. Day, Hickman, Williams & Co.; Leo J. Filstead, J. C. Kupferle Foundry Co.;



THE USE OF AJAX *Phosphor-Copper*

Send for booklet
"INGOT METALS OF TODAY"

●

15 STANDARD ALLOYS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Successful foundrymen deoxidize or "clean up" molten metal by a scientific method worth using *as indicated:*

They use phosphorus . . expertly . . in the form of "Ajax Phosphor-Copper" . . added as the crucible is removed from the furnace . . for virtually all brass and bronze alloys.

In notched waffle sections, or in shot form, Ajax 15% P-Cu does its work at .01% (1 oz. per 100 lbs.). Introduced, and having time to react when stirred with a whirling motion of the skimmer, it causes oxides to rise for effective removal by skimming from the surface. It is best to avoid phosphorus build-up from back stock.* . . If you use phosphorus these days, use Ajax Phosphor-Copper (useful also in producing your phosphor bronze).

THE AJAX METAL COMPANY
ESTABLISHED 1880 PHILADELPHIA

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AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ELECTRIC COMPANY, INC., *Electric Salt Bath Furnaces*
AJAX ENGINEERING CORP., *Aluminum Melting Induction Furnaces*

C. L. Harrell, Sterling Steel Casting Co.; William L. Heckmann, National Foundry & Machining Co.; Ralph M. Hill, East St. Louis Castings Co.; Karl S. Howard, General Steel Castings Corp., Armor Plant; A. I. Kilpatrick, A. Kilpatrick & Sons Foundry Co.; Paul Kluge, Tower Grove Foundry Co.; Roland T. Leisk, American Steel Foundries; Herbert H. Luedinghaus, St. Louis Malleable Castings Co.; George E. Mellow, Liberty Foundry Co.; H. P. Mueller, Century Foundry; Francis T. O'Hare, Central Brass & Aluminum Foundry Co.; R. O. Shive, Sterling Steel Casting Co.; Harry Sanders, American Foundry & Mfg. Co.; Harry E. Thiele, General Steel Castings Corp.; S. C. Thomson, Federated Metals Division; Chester H. J. Walcher, American Steel Foundries; Joseph D. Walsh, Scullin Steel Co.; Herman Weible, Maco Foundry & Enamel Shop; Emmet A. Williams, National Bearing Metals Corp.

Golf committee: Chairman, Roy A. Jacobsen, Carondelet Foundry Co.; Vice Chairman, Ralph M. Hill Jr., East St. Louis Castings Co.; George Hamilton, Century Foundry; William T. Mellow, Liberty Foundry; Parker H. Woods, M. W. Warren Coke Co.

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Book Review

The Blast Furnace, by Roy P. Hudson; fabricoid; 254 pages 5½ x 8½ inches; published by Chemical Publishing Co., Inc., Brooklyn, N. Y. Price $3.75

This work should interest practical blast furnace men, fuel preparation engineers, technologists and metallurgical chemists and students. The subject of blast furnace fuel is treated much more extensively than the subject of iron ores. The author justifies this attitude by the statement that preparation, quality and evaluation of metallurgical coal and coke are of contemporary study and research, while the preparation, quality and evaluation of iron ores were worked out and put to general use many years ago.

The work is divided into three parts, raw materials, products and byproducts, and sampling and analysis. Scope of the work is indicated by the 17 chapter headings: Blast furnace, iron bearing materials, fluxing stone, blast furnace fuel (2 chapters), chemical principles, burdening the blast furnace, the blast, pig iron and ferroalloys, blast furnace slag, blast furnace gas, sampling and analysis of iron bearing materials, of fluxing stone, of fuel, of pig iron and ferroalloys, of blast furnace slag, of blast furnace gas.

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STEEL FOUNDERS HOLD LARGEST MEETING

(*Continued from page 95*)

is poured directly into the mold, but with the bottom pour ladles, a funnel shaped cone is employed to direct the metal from the ladle into the mold. Type of head employed varies with the type of casting. The speaker showed examples of various types of castings and of the equipment employed in their production.

C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., presented the third paper of the panel on the subject "Centrifugal Castings by the Use of Horizontal Spindle Machines and Permanent Molds." Mr. Donoho stated that the centrifugal process for the production of pressure pipe in gray iron has been employed by the American Cast Iron Pipe Co. since 1922, and that the soundness of the practice had long been proven. That organization began producing steel castings centrifugally by the horizontal method in 1940, and since that time has produced a variety of steel castings.

The horizontal method is especially suited for quantity production of castings which may be revolved around their own axis. Metal molds are advantageous where large quantites are required, where the outer contour of the casting is simple, and where a fast cooling rate is permissible. Sand lined molds are advantageous where it is necessary for the metal to flow long distances in the mold, where the shape of the castings is such as to provide difficulty in removal of the casting from the mold, where the shapes vary, and where a slower cooler rate is desired. In discussing the speeds of rotation, Mr. Donoho stated it has been found desirable to use higher centrifugal speeds to squeeze out impurities, but that an excessively high speed causes hot tears in the castings. Metal for the castings produced by his organization is melted in 5 acid electric furnaces.

Mr. Donoho showed slides of a variety of castings produced by the American Cast Iron Pipe Co., including bogie wheels for tanks and other tank castings, ship shafting, hause pipe, and steel liners for tank and airplane engines. He described the production of aircraft engine barrels, stating that the molds operate at from 300 to 800 degrees Fahr. Molds are heated to 300 degrees before being placed in operation, and a sufficient number is provided so that they have cooled to 800 degrees or less by the time they are used again. The speaker showed how the metal is weighed and poured into the spinning molds and stated that equipment is available to make hause pipe up to 51½ inches in diameter.

Poured In Vertical Position

A. T. Baumer, Weir Steel Co., Milwaukee, in discussing "Centrifugal Castings Using Vertical Poured Molds," described the equipment and practice in producing cluster type mold patterns revolved around a central gate or axis and individual castings revolved around their own axes. These castings are produced in dry sand cores and poured from geared bull ladles. Mr. Baumer emphasized the safety features of pouring with bull ladles. With the aid of slides the speaker showed methods of production, equipment used, the core assemblies, and the containers in which the core assemblies are placed for spinning. The spinning floor, the tubs, and the shakeout all are connected with the exhaust fan to remove the dust immediately from the department.

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age yield on all castings produced, both those revolved around their own axis and those revolved around a center gate, is 71.3 per cent. Mr. Baumer stated that the cost of molding and handling is considerably higher than for static castings and that the process lends itself only to special castings where extreme quality is required. He stated that centrifugal castings are no panacea for all foundry aches and pains.

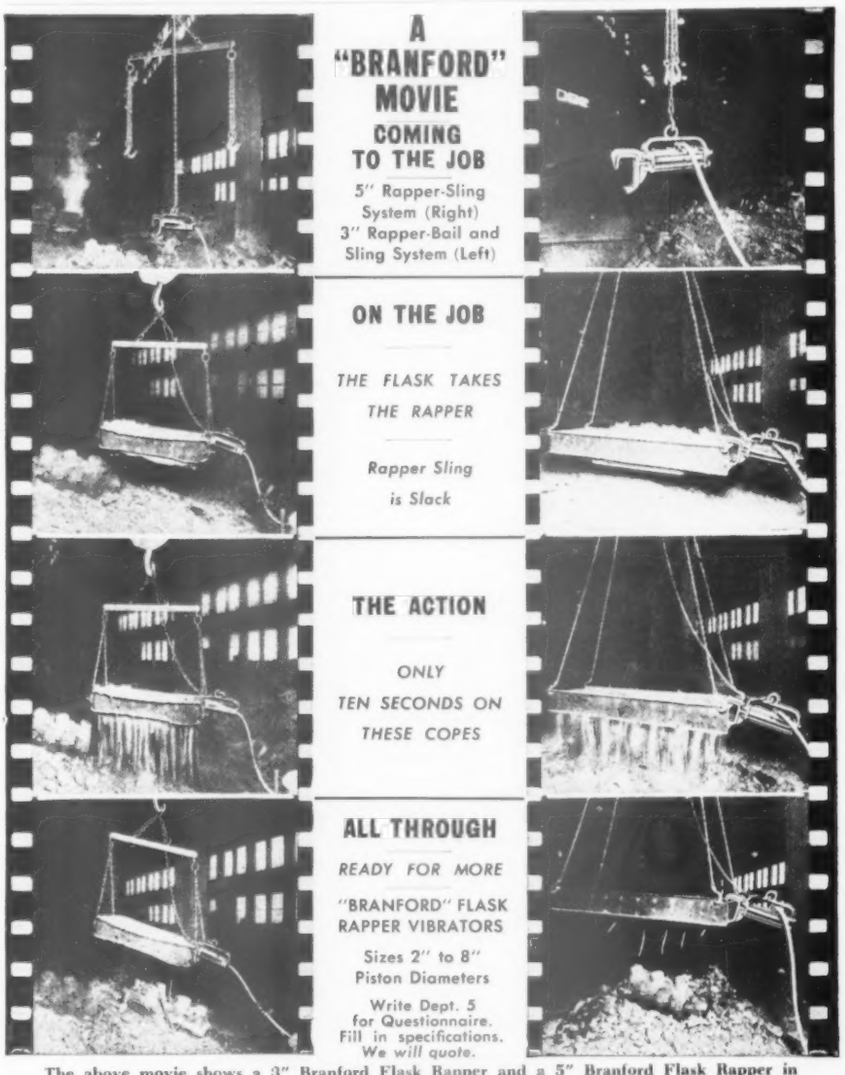
Anton Johnson, Oklahoma Steel Castings Co., Tulsa, Okla., described the practice followed by his organization in a paper entitled "Centrifuging During Pouring of Steel." Castings are produced with vertical type spinning in molds made up of cores. An offset joint between the cope and the drag is provided to prevent shifting. Molds are fed in and out of the flask on roller conveyers. Mr. Johnson illustrated various methods of gating and showed slides of both static and centrifugal castings, illustrating the difference in gating required by the two methods. He stated that the centrifugal process has reduced the cost, and produced a casting having a better appearance. Much greater yield is secured, and at the same time the development has contributed to the war effort and added to the progress of the steel casting industry.

Spin After Pouring

In the final paper of the panel, J. B. Caine, Sawbrook Steel Castings Co., Lockland, O., discussed "Centrifuging After Filling the Mold with Steel," a paper prepared in conjunction with W. F. Wright of the same company. In this process, normal production is followed, and then the mold is rotated on a horizontal platform immediately after the metal has been poured. Sand and molding methods are the same as if the castings were to be produced statically, with 99 per cent of the castings being made in green sand. Fundamentally there is no difference in heading practice. Gear blanks compose most of the output produced by this process, and a yield of 92 per cent is secured. In producing castings by this method, Mr. Caine stated that the castings must be geometrical in shape, and that the cavity must be so designed as to be fed by one runner, and that the casting itself must be designed for production by the centrifugal process. That process provides an increased yield, lowers the molding and cleaning cost, and where the casting is properly designed, produces a product that weighs less than one manufactured by the usual procedure. Mr. Caine stated that the greatest difficulty thus far encountered is getting designers to change designs to secure the proper results by the centrifugal casting method. A spirited discussion followed the presentation of the six papers at this session.

The first session of the annual meeting, at which Oliver E. Mount, vice president, secretary and treasurer American Steel Foundries, Chicago, and president of the Steel Founders' Society of America, presided, featured reports of several committees. The report of the committee on Occupational Classifications was made by Lloyd C. Farquhar, American Steel Foundries, East St. Louis, Ill., and chairman of the committee; on Raw Materials by committee chairman W. W. MacMillen, National Malleable & Steel Castings Co., Cleveland; on specifications by Charles W. Briggs; on Advertising by committee chairman Clarence Tolan Jr., Dodge Steel Co., Philadelphia, and on Technical and Operating by Mr. Briggs.

Raymond L. Collier, secretary and treasurer of the society presented his annual report which indicated that the society is pursuing a sound financial policy. Col. Merrill G. Baker, executive vice president, in his annual report, indicated that 96 per cent of the steel foundry industry is supporting the society financially. He listed 25 organizations which recently have become affil-



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iated with the society, and then reported on the various activities of the organization including the assistance which has been rendered the various war agencies. In closing he paid high tribute to the service which steel castings have rendered the American war effort during the past year.

Chauncey Belknap, counsel of the Steel Founders' Society of America, speaking on "Recent Developments Affecting the Industry" devoted most of his discussion to the various provisions of the maximum price act, as they affect industry.

An inspiring talk on "Salesmanship" by A. H. Motley, vice president, Crowell-Collier Publishing Co., New York, featured the luncheon meeting on Wednesday, Feb. 10. Keith Williams, Pratt & Letchworth Co., Buffalo, was toastmaster.

President Mount presided at the morning session on Thursday. George F. Hocker, chief, Forgings and Castings Section, Steel Division, War Production Board, Washington, in a talk "As the Steel Division, War Production Board, Views the Casting Industry," paid high tribute to the important war contribution of the steel foundry industry. Mr. Hocker pointed out that in 1940 the capacity for the production of steel castings in the United States was 1,600,000 net tons and that the estimated production that year was 985,600 tons. In 1942, with a production of 1,578,000 tons, the industry operated at near capacity. By the end of 1942 a number of plants in the United States had been expanded to 320, with an estimated production capacity of 2,339,000 tons. This increase in capacity was provided by building new plants, converting gray iron and malleable plants to the production of steel castings, and expanding existing plants. Mr. Hocker stated that by the end of 1943 there will be approximately 335 steel foundries in the United States with an estimated capacity of 3,154,000 tons. Total requirements for the present year will be equal to the production capacity. Due to the fluidity of war production, there will be changes in the types of castings needed, providing excess capacity in some lines and shortages in others.

Requirements Are Heavy

Mr. Hocker indicated that present expansion programs in aluminum and magnesium, steel, and petroleum are providing heavy requirements for steel castings. He stated that while there had been considerable discussion regarding the cut back in the tank program, this represented only curtailment of projected capacity and that in 1943 requirements for tank castings, which will be considerably greater than in 1942, will require all the present production facilities. He indicated that the steel division has a directive for the conversion of the capacity for the production of centrifugal steel castings and static steel castings to replace forgings in aircraft construction and other uses. In this connection he complimented the society on the extensive panel discussion on centrifugal castings which was held the previous day. In closing he paid tribute to the work of the steel foundry industry in the conservation of critical alloys, mentioning especially producers of high alloy castings. In addition to meeting the war demands, the steel foundry industry has continued to supply castings for essential civilian needs, such as railways and other forms of transportation.

C. S. Ching, director of industrial and public relations, United States Rubber Co. and a member of the National War Labor Board, Washington, presented an interesting discussion on "The War Labor Board and You." Mr. Ching outlined the make up of the War Labor Board and stated that in his opinion the tripartite set up, in which industry, labor and the general public have representation, is a most sound procedure. Mr. Ching indicated that he is disturbed in the lack of responsibility in the wage stabilization program on the part of

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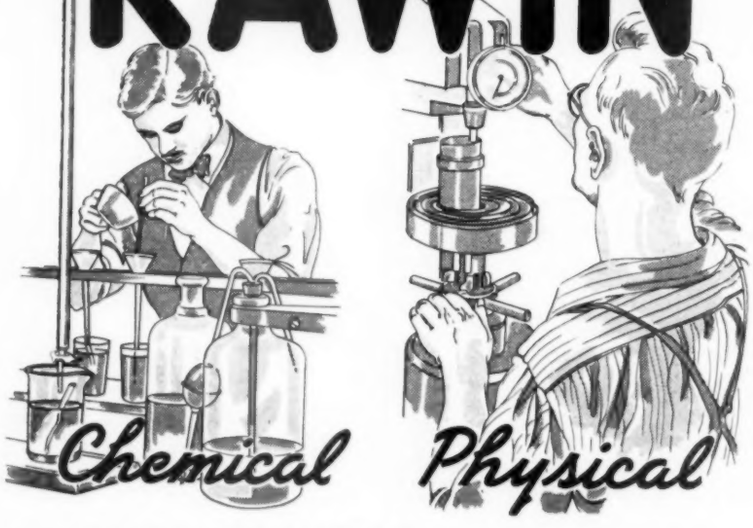

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American employers. In his opinion the best service that industry can render today is to fight wage increases, not only before the board, but back home. He pleaded with industry not to make wage agreements and then put the onus of the procedure on the War Labor Board, but to let the wage increase discussion come to the board as a wage dispute. In the latter case, the dispute brings out all the facts so that a fair decision can be made. Mr. Ching stated that the "little steel formula" has had many defects, but that with all of its defects, it has been something to tie to in the present emergency. He does not know whether or not the board will continue the wage formula. The speaker then outlined the set up of the regional offices which have been organized to facilitate handling of the work of the board.

In conclusion, Mr. Ching warned that if industry does not organize better and present the industry point of view in Washington, industry will continue to be pushed around as it has been for the past 10 years. Lack of organization in presenting an industrial point of view is playing right into the hands of the bureaucrats. Mr. Ching declared that industry does not always seem to know what it wants. Organized labor always knows what it wants and if organized labor does not secure what it wants on one approach, it has other approaches ready to follow.

Discuss Research Program

President Oliver E. Mount discussed the research program of the Steel Founders' Society, which was authorized recently by the board of directors. He pointed out that such a program had been urged by members for a number of years but that no feasible means previously had been presented for adequately financing such a project. The board of directors now has created a technical and research department and has appointed Charles W. Briggs as technical and research director. The board also has organized two committees, 1, the research fund committee and 2, the technical research committee. In general practice, the technical research committee research director will select projects to be studied. As a start, President Mount referred to the 52 research projects relating to cast steels and steel foundry problems, proposed by Mr. Briggs and sent to the membership in December. After projects have been selected they will be submitted to the research fund committee and that committee, if it approves, will refer the project to the board of directors for final decision. Research will be conducted in individual member companies, by two or more member companies, or in Universities and research institutions.

Interesting discussions of various phases of the Steel Founders' Society research program were presented by Edward W. Campion, the Bonney-Floyd Steel Co., Columbus, O.; Sheldon V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; Keith Williams, Pratt & Letchworth Co., Buffalo, and W. D. Moore, American Cast Iron Pipe Co., Birmingham, Ala.

In the final discussion of the Thursday morning session, E. Barrett Mason, supervisor, Controlled Materials Plan Service Branch, Controlled Materials Plan Division, War Production Board, Washington, discussed "The Controlled Materials Plan" and Dr. Robert K. Burns, regional director, National War Labor Board, Chicago, spoke on "Government Control for Salaries and Wages and Functions of the Regional War Labor Board."

Alfred P. Haake, Chicago, presented an interesting address at the luncheon meeting on "The Fifth Freedom; Maintenance of the Free Enterprise System." S. Wells Utley, Detroit Steel Castings Co., Detroit, was toastmaster. A feature of the luncheon was the presentation of the Lorenz Memorial Medal to Oliver E. Mount, president of the Steel Founders' Society for his conspicuous service to the steel castings industry in the

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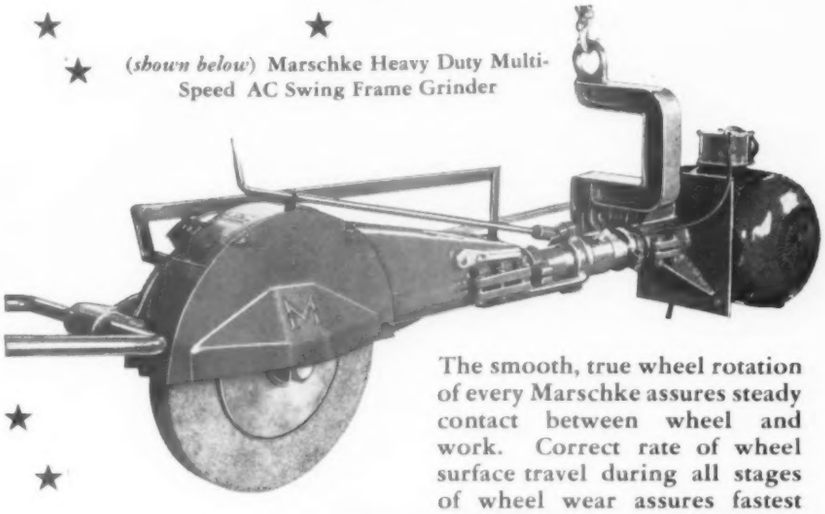

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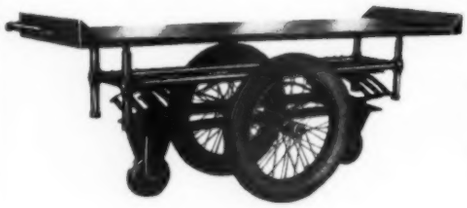

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Book Review

Steel Piping Materials, paper, 249 pages, 6 x 9 inches, published by the American Society of Testing Materials, 260 South Broad street, Philadelphia. Price $1.75.

This compact volume contains all the specifications of the American Society for Testing Materials relating to steel piping materials; most of which were developed through its committee A-1 on steel. It contains 42 standards of which 5 relate to steel castings; 10 to boiler, superheater and miscellaneous tubes; 15 to pipe; 2 to still tubes; 3 to heat exchanger and condenser tubes; 4 to forgings and welding fittings, and 3 to bolting. In addition numerous emergency alternate provisions also have been included. For convenience the various specifications are listed in numerical order under their specific designations as to application.

PRODUCING MAGNESIUM CASTINGS

(*Continued from page* 85)

bottom gating, using a number of gates in preference to one or two. Magnesium loses heat rather rapidly, and hence, will not flow any great distance, particularly in thin section castings. Also numerous gates eliminate trouble from hot spots caused by a large flow of metal over a small area of sand.

In cases where the casting height is sufficient, two-level gating is employed. That is to say one system of gates opens into the bottom of the casting cavity, and the other system is near the top. That procedure permits the entrance of hot metal near or at the top, and provides better feeding. The counterflow principle consists essentially in extending the runner from the sprue to the gates somewhat beyond the farthest gate in the system. The molten metal travels along the runner to the blind pocket or extension carrying any dirt or dross along with it. The material lodges there, and the now clean metal backs up to and flows into the gate. The filtering medium usually employed is steel wool, and it is located close to the mold cavity.

Gates Larger Than Sprue

All parts of the gating system are inter-related so that the minimum turbulence is obtained. In general the sprue has the smallest cross-sectional area, the runner system has a larger cross-sectional area than the sprue, and the cross-sectional area of the gates is somewhat larger than that of the sprue. As may be expected, that arrangement not only smooths out the flow of metal but also reduces the pressure or head of the metal at the entrance to the mold cavity, providing an ample quantity of metal with a quiet flow. Since the sprue has the smallest cross-sectional area, it can be choked easily to prevent entrance of dross or oxide film. Wherever possible the gates are located directly into the risers to insure the risers being filled with hot metal, and hence, that the risers can feed the casting adequately.

In pouring magnesium it never is advisable to permit the metal to enter directly into the sprue since it causes turbulence and might cut away some sand at the sprue edge and carry it into the mold cavity. Hence, pouring boxes or basins are employed at the American Magnesium Corp. They are made of fabricated steel without any lining since molten magnesium will not attack it, and are made long enough and of sufficient width to permit the metal stream to quiet down before entering the sprue.

Since every casting is more or less a law unto itself, the practice at the American Magnesium Corp. is to lay out or design the gating system and make several pilot castings before getting into production. The pilot castings are sectioned and fractured at various points to determine the soundness, and corrections are made where required. After a satisfactory pilot casting is obtained, the job is placed in production. From time to time individual castings are taken from the run, and subjected to sectioning and fracturing to see that they possess the requisite soundness.

Cleaning and finishing of magnesium castings at the American Magnesium Corp. follows a regular routine which involves considerable work before the castings are ready for shipment. Between various operations the castings undergo an inspection. Castings are knocked out of molds after cooling and are subjected to an inspection. Then they are rough abrasive blasted before any gates or risers are removed. Following the abrasive blasting, the castings are inspected again, and the gates and risers are sawed off. Then the castings are

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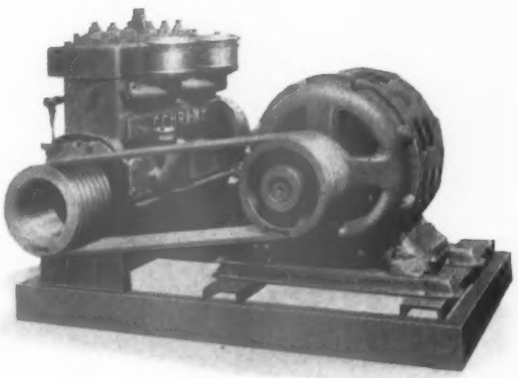

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rough chipped with some snagging in the case of small castings. Snagging is performed on grinding wheels located under hoods connected with a powerful downdraft exhaust. The grindings are carried directly into water.

After those operations the castings are inspected again, and then are subjected to heat treatment where required. As previously mentioned one of the two alloys always is used in the heat treated state while the other may or may not be heat treated. The 9 per cent aluminum 2 per cent zinc alloy which always is used in the heat treated condition is subjected to a temperature of 760 to 780 degrees Fahr. and then air quenched. The 6 per cent aluminum 3 per cent zinc alloy when heat treated is raised to a temperature of 720 degrees Fahr., and air quenched. Both alloys are treated in batch type furnaces using a protective atmosphere of sulphur dioxide containing about 0.5 per cent of the latter.

Following heat treatment the castings undergo careful finishing operations to provide smooth surfaces which decrease the possibility of stress raisers, such as small notches, being present. Finishing operations include use of rotary files, and polishing with abrasive coated wheels. As might be expected those result in production of finely divided material. As in the case of snagging, operations are conducted under hoods with downdraft exhaust which carries the fine material into water. The castings are abrasive blasted after filing and polishing. At the completion of those finishing operations the castings are inspected again and then are given a corrosion resistant coating obtained in a dichromate bath. Two types of bath may be used for the purpose.

One contains 1.5 pounds sodium dichromate, 1.5 pints nitric acid (sp.gr.1.4), and water to make 1 gallon. The other, which is that used by American Magnesium Corp., is comprised of 1 pound chromium trioxide, 0.9-pint nitric acid (sp.gr.1.4), and water to make 1 gallon. The solution is checked each day for strength, and additions are made as needed to maintain the specified concentrations. The bath is contained in an aluminum tank, and the castings are dipped in it. Then they are lifted out, permitted to drain back for a few minutes, and immersed in running tap water contained in a wood tank. The casting is removed from the running water, rinsed in a wood tank containing nearly boiling water, and then dried with an air blast.

After dichromating the castings are given a final, careful inspection. Where required, the castings undergo a pressure test. Also in many cases the castings are subjected to checking on special fixtures to see that they meet dimensional requirements before shipment.

This is the second and concluding article of a series of two on magnesium foundry practice. The first article appeared in the February issue. THE EDITORS.

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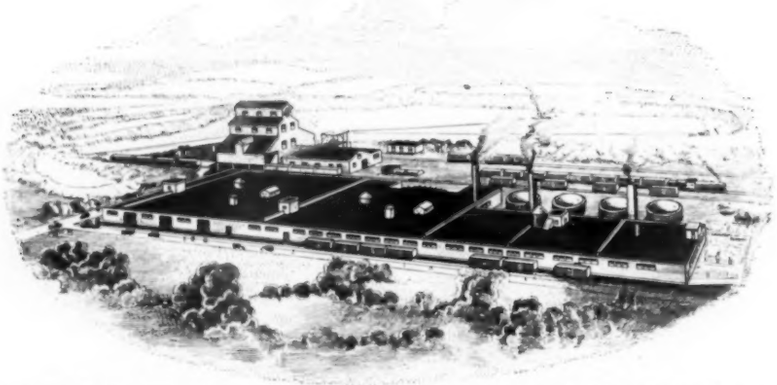

Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant

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Research Building Is Dedicated

Illinois Institute of Technology dedicated its new $250,000 Metals and Minerals Research Building Jan. 11, in ceremonies conducted by Dr. Henry T. Heald, the institute's president, and Harold Vagtborg, director of its Armour Research Foundation.

The building, first of seven modern functional units planned for the $3,100,000 new campus development, is 64 x 168 feet, three stories high, and affords 500,000 cubic feet of space. It provides facilities for research in gray iron, steel and nonferrous foundry practice; also forging; powdered metals; electroplating; wire drawing; steel cable testing; and has analytical, petrographic, metallographic and x-ray diffraction laboratories.

The foundry division is equipped with two cupolas, a bessemer-type converter and two electric furnaces.

PISTON RINGS FOR WAR MACHINES

(*Concluded from page* 91)

form. When the cold head of the stream flowed into the pollywog, the temperature of metal in the entire ring was practically uniform. Originally designed merely as little blobs of metal, the pollywogs later were constructed with sharp corners to take the place of stars in the tumbling barrels where the castings are cleaned.

While the shape and size of the gates vary to some extent depending on the size and number of patterns on a plate, the basic design is a number of runners radiating from the central sprue and terminating in short passages in the cope from which the iron enters each casting through a small pinched gate.

Metal is melted in a battery of five cupolas, one 30 inches and the other 42 inches inside diameter, set up in a straight row on the east side of the foundry and supplied with air from an elaborately equipped blowing room in an adjoining room. The blowers are adjusted to deliver air in definite volume and at definite pressure. Elaborate experiment conducted over an extended period indicated that the moisture content of the blast exercised a profound influence on the physical characteristics of the piston rings produced from the metal. Air for the blowers passes through a chamber where the moisture content is adjusted automatically to meet fluctuating climatic conditions. When the humidity is high, a certain amount of moisture is extracted from the air before it enters the blower. When the moisture content of the air is not up to the required amount, moisture is added to the air flowing through the chamber.

Iron Melted Hot

Charges for the cupola are made up with the most meticulous care and attention to detail. A charge for the 30-inch diameter cupola contains 400 pounds iron, 70 pounds coke and 25 pounds dolomite screened to approximately 1-inch size. For the 42-inch diameter cupolas the charge is 1000 pounds iron, 175 pounds coke and 60 pounds dolomite. In this foundry coke economy is not a factor where the prime requisite is blazing hot metal.

Melting metal for prolonged periods at excessively high temperature naturally imposes a severe strain on the refractory lining, particularly at the melting zone. Resistance of the lining has been improved to a considerable extent by installing a water cooled jacket around the cupola shell in this area. With an inlet at the bottom and an outlet at the top, water is kept circulating while the cupola is in operation.

Slag from the cupola runs through a spout at the back and falls into a small conical shape cast iron pot provided with a 4-way foot on the bottom which rests on a pedestal. When the pot is filled it is picked up by a bail suspended from a monorail, removed to the dump and replaced by an empty container. The pots were made in the jobbing section of the foundry and since this section is not equipped to handle large molds, the casting was molded and cast horizontally in four sections, afterward bolted together.

While on the subject of cupolas it is interesting to note that a cupola was set up in the yard to melt and convert into pigs a large accumulation of light scrap. The installation on a small scale is somewhat similar to a blast furnace as shown in the accompanying illustration. A catapult arm lifts the charge and throws it into the top of the furnace. Pig molds manually operated on rollers pass in rotation under the spout.

Michigan Alkali Co. and J. B. Ford Co. have been consolidated to form the Wyandotte Chemicals Corp., Wyandotte, Mich.

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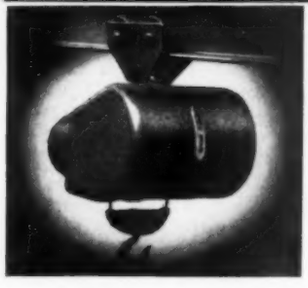

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Keeps Starters In Operation

A program of constant checks against oil, dirt and moisture that enabled one large manufacturer to run 6500 electric motors for 10 years with only 10 minutes lost time due to power failures was described recently to the Electrical Association of Rochester, by L. E. Markle, control equipment engineer for the Westinghouse Electric & Mfg. Co.

This particular plant, according to Mr. Markle, adopted a vigilant maintenance program and immediately discovered that practically all of its starters and other equipment needed attention. Since the regular inspection and cleaning program was started, there have been almost no shutdowns. Such programs are more important than ever before, to keep the motors turning to meet the demands of war. Rest periods are short or may not occur at all. Machinery idle for years has been pressed into service.

Close co-operation with manufacturers by motor starter users may point the way to changes in design that will reduce the need for maintenance and prevent shutdowns for repairs, he added. Redesign and improvement of a few parts have been known to increase the useful life of a complete starter for a long time. No matter how good a design may be it can always be applied to some service or in some atmospheric conditions where its performance may not be entirely satisfactory.

Book Review

Grinding Wheels and Their Uses, by Johnson Heywood, cloth, 436 pages, 6 x 9 inches, published by the Penton Publishing Co., Cleveland. Price $3.

This volume is the second edition of a noteworthy compendium of information on grinding wheels and applications first prepared under the auspices of the Grinding Wheel Manufacturers' Association in 1938. The present book has been revised thoroughly and includes several additional chapters. Where older methods have been improved, the old descriptions have been dropped, and descriptions of the new ones substituted.

More stress has been given to ingenious kinks for solving difficult grinding problems. Also attention is directed to the designing of parts which will permit grinding instead of machining to produce a better product, increase production or decrease costs. The book not only serves as a handbook on modern grinding practices but also as a textbook for teaching grinding machine operators, apprentices and students in trade schools and technical colleges.

HIGH TEST IRON PRODUCTION

(*Continued from page* 94)

found in tables included in engineering handbooks.

Graphically portraying volumes of air necessary for different room temperatures and atmospheric pressures is very convenient. This can only be done for *one specific weight of coke*. It might be here mentioned that coke added to compensate for carbon picked up by steel should *not* be used in determining blast volumes. That is, if 190 pounds of coke are used, 25 pounds are merely for carbon pick-up, blast should be calculated on the basis of 165 pounds of coke.

When trouble is encountered most foundries increase the size of coke splits beyond that required for good melting. This leads to slower melting, and greater pick-up of impurities with consequent drop in quality. If coke is proportioned correctly for the cupola, the *metal* charge should be varied.

Composition Affects Quality

Physical composition of the charge, regardless of analysis, will have considerable influence on the quality. If rails are not available steel should be medium sized, having a section of not less than ¼ inch or more than 2 inches. Light scrap or punchings should be avoided, but if only such materials is obtainable, percentage of steel in the mix must be lowered. Oxidation of light scrap will tend to retain more carbon in solution, and, unless the amount of steel is lowered, it will be very difficult to correctly graphitize the iron.

Machine cast pig is preferable. In making up charges, best results are obtained when a combination of high silicon and low silicon pig is used, rather than either pig alone. Return scrap should be segregated according to analysis, and high-strength returns used on future high-strength charges. Excessively large risers should not be used. They can be melted in other mixes where dilution is not important.

Malleable scrap is beneficial, and may be used where low carbons are desired. It will lower the percentage of steel required, and still give satisfactory results.

Due to its consistency automotive scrap is preferred to machinery scrap. However, blocks must be stripped, and *aluminum pistons removed*. Machinery scrap must be of a medium section, and dirty or heavily rusted scrap must not be used in high test irons.

Carbon and its distribution is the main factor determining final qualities of cast iron. With lower carbon there is less graphitic carbon, so efforts must be made to keep it as low as possible, and yet retain good pouring qualities.

Silicon also should be low. It will precipitate graphitic carbon even at the expense of pearlite.

Nickel usually is substituted for part of the silicon, thus keeping the percentage of this weakening element down. Nickel is advantageous, and can be melted either in the cupola or added in the ladle. Good results are obtained with additions of from 0.50 to 1.50 per cent depending on the job. This is further discussed under inoculation.

Manganese should be high, as it slightly increases solubility of carbon in iron, and thus will hinder precipitation of graphite. It may as chromium, form a mild double carbide with iron. This quality may prove beneficial on heat resisting applications where varying temperatures may crack irons containing the tougher iron-chrome-carbide.

Phosphorus should, if possible, be kept low. It tends to form free steadite, which, due to its low melting point, may

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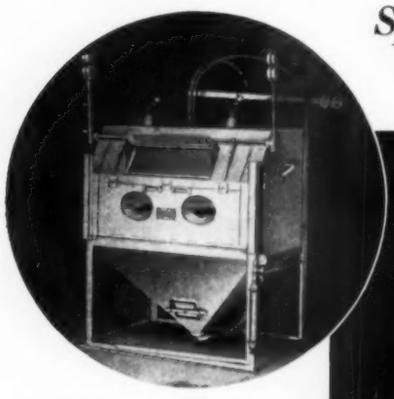

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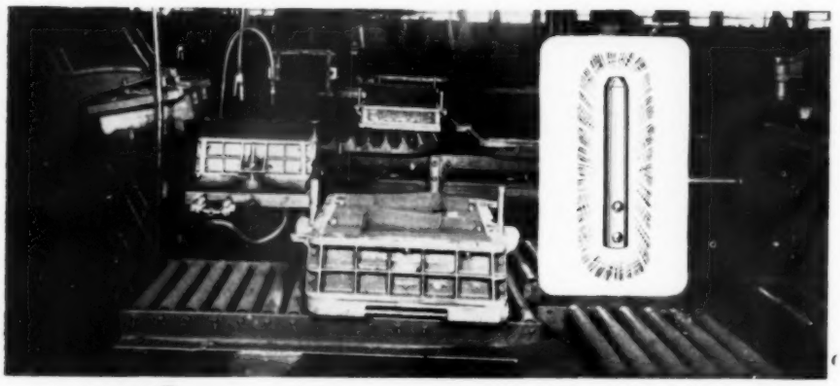

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segregate along grain boundaries. This possibly may weaken the iron.

Sulphur should be low. This element tends to embrittle iron.

Analysis can be calculated either by percentage or weight. Printed or mimeographed forms are useful for this, and will serve as a permanent record. Table I illustrates a simple form for percentage calculations, and Table III is based on weights of the element. Final analysis is reached easily in Table I by multiplying the percentage of material by percentage of element contained and adding the results. In Table III it is found by multiplying weight of material by percentage of element contained, adding results, and dividing the total by the weight of the charge.

Table II gives recommended analysis for various sections, strengths in 1.2 inch diameter and 18 inch center test bars, base wedge, desired wedge and amount of inoculant necessary.

Since analysis of raw materials varies considerably, great care must be taken in weighing the charge. A small variation in weight of high silicon pig will change the final analysis considerably.

Steel should be charged on the coke, pig iron next, then scrap. Small scrap or pig should be charged in the center, and heavy material placed along the wall. Medium sized scrap may be placed midway between these points. If judgment is used in placement, and the charge evenly distributed, there will be a minimum of dilution.

Use Various Inoculants

Analyses in Table II will produce white iron in recommended sections. By graphitizing this at the spout, machinability and superior quality will be attained. It is recommended that the foundry use ferro-silicon for graphitizing until practice is fool-proof, then other inoculants such as calcium silicide, flake graphite, ferrocarbo grain and others may be investigated. Then the foundry can make its own choice on the basis of quality and economy.

As seen in Fig. 2, a small amount of inoculant will have great graphitizing powers. This power progressively diminishes with larger additions. For the sake of quality and economy it is suggested that the smallest amount of inoculant that will remove free carbides be used.

It is to be added into the molten stream at the spout. Weighed amounts can be added conveniently with cans. If much high test iron is to be made, a machine delivering an adjustable amount of silicon per minute can be installed over the spout. Daily spout additions will also justify building the spout as in Fig. 4. This will agitate the molten stream, and insure complete absorption of the inoculant.

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With practice the correct amount of silicon will be added. However, due to many variables, the wedge test may indicate excessive hardness. When iron is too hard additional silicon may be added safely to attain the desired wedge. If this is necessary, the iron should be transferred into another ladle either during or after additional silicon has been added, and another wedge taken.

To avoid ladle additions, at least two taps should be made for a ladle and a wedge taken at each tap. If the iron is too hard, more silicon can be added on the next tap.

Increasing additions of silicon alone will precipitate graphite progressively from the iron, even at the expense of pearlite. Excessive graphite will lower the strength, and not enough will cause difficulty in machining. Nickel used in conjunction with the inoculant will precipitate graphite from the *carbides*, but will *not* break down pearlite. It has a refining action on pearlite, and even forms it when free ferrite and graphite are in the matrix. Thus, to insure maximum physical properties with excellent machinability, use of nickel strongly is urged in conjunction with the inoculant. Its use will help offset harmful effects of too little or too much inoculant.

Check Each Ladle

Oxidation, temperature and variations in analysis make it impossible to predict the exact amount of inoculant necessary. Therefore, it is important to make a rapid and accurate check on each ladle. This is easily done by the wedge test. Fig. 5 illustrates recommended sizes for wedges, and Fig. 6 the appearance of cast and broken wedges. Wedge measurements should be in thirty-seconds of an inch, that is a No. 8 wedge measures 8/32 inch across. Wedge depth is *not* measured, measurements are read across *A*—*A*, as shown in Fig. 6. The wedge test is preferred because it is much more rapid, and the separation between white and gray portions is more distinct than in a chill test.

Samples may be taken with a long handled spoon type ladle holding only a few pounds of iron. This is immersed beneath the surface, a sample picked up and immediately poured. The metal sets in a few seconds. The wedge may be removed with tongs, adhering sand knocked off, and the wedge cooled in water. It should not be plunged under the surface immediately. First the base is cooled until it loses its bright red color, then it is gradually dipped deeper until the whole is cooled. With practice the entire operation on a ½-inch wedge can be completed in 30 seconds.

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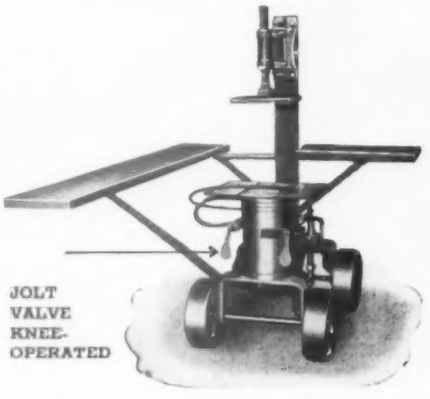

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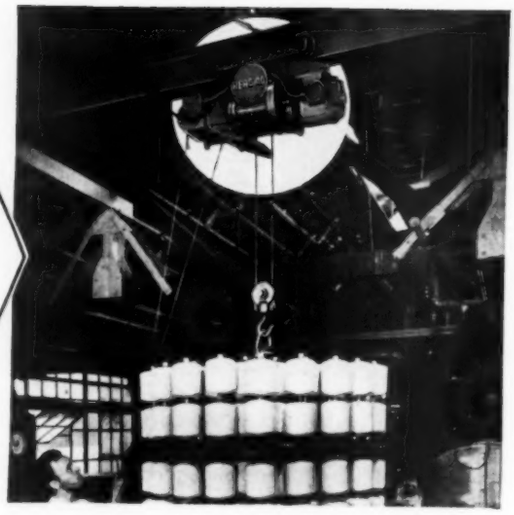

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volume, the first iron will be hot, and at no time should it be necessary to pig it. However, the first two charges should contain only 30 per cent steel with a silicon of about 1.60 per cent. Then the higher steel mixes may be melted. The first iron will have a base wedge of about 8/32-inch, and after inoculation to 2/32-inch can be poured in sections ranging from ¼-inch upwards. It is recommended that this be poured into jobs calling for ordinary gray iron, as the carbon will probably be high, and the strength only around 35,000 pounds per square inch.

The following high test iron should be white hot. If it is cold, the bed probably is prepared incorrectly. Raising the blast may help. When more than five charges of 70 per cent steel mixes are melted, oxidation may be encountered. A much larger amount of inoculant will be needed, as it is difficult to graphitize oxidized iron. Oxidized iron will emit a shower of sparks while in the spout, and is recognized easily. It indicates that the bed is too low, probably due to small coke splits, which can be remedied in the future by larger coke splits or booster splits advantageously placed. If the coke splits are correct, they should not be changed, but then the metal change should be varied. If oxidized iron is encountered the blast should be lowered until this condition is eliminated.

Pour The Iron Hot

Metal should be tapped into *preheated* ladles, and poured *hot*.

Taps of 600 pounds or less from a cupola melting more than eight tons per hour are not called for. High strength irons are being produced with taps of 2,000 pounds or more from a 48-inch cupola. However, if there are only two or three charges of high test iron, rapid taps are justified, since this will help prevent dilution. Then too, if carbons are running over 3.10 per cent smaller and more rapid taps also are justified, but this higher range of carbon should not be encountered with correct melting.

Low carbon irons will shrink more than ordinary gray iron, and all castings poured with this type of iron must be properly fed. This can be done by the use of heavy risers, or by gating in such a manner that the last spot to cool will be out of the casting even with small risers. The latter method is explained, and illustrated in a paper entitled "Production of Uniform Dense Structures in High Test and Alloy Iron Castings", by M. A. Scott, *Transactions* of the A. F. A., Vol. 47, 1939.

It is imperative that some method of checking tapping weights be used, since it is impossible to meet varying analysis without knowing the exact

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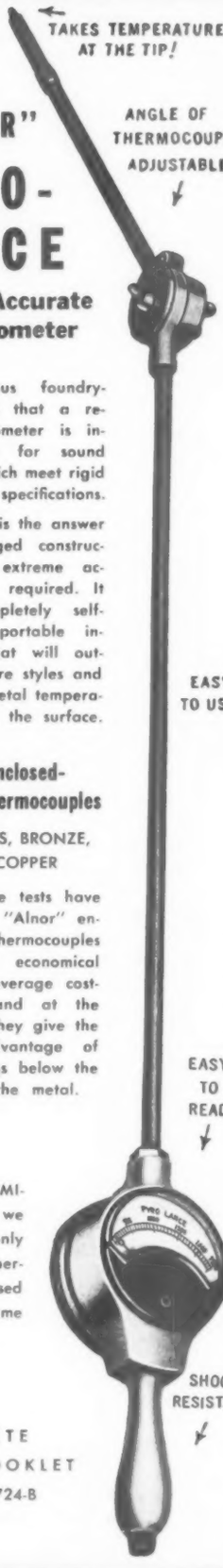

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weight tapped. *This cannot be overemphasized.*

Difficulty sometimes is encountered in initial attempts to produce high test iron. This is mainly due to dilution caused by melting small amounts. To avoid this it is necessary to use the two 30 per cent steel charges discussed under pouring, and to use two of the higher steel charges immediately following, even though only a ton of high test iron is required. Thus 3000 pounds are first tapped, and poured into jobs requiring either gray iron or semi-steel. Then the high test iron should be tapped quickly in lots of 600 pounds, until 2000 pounds is tapped. The following iron can be left either in the well to be diluted with gray iron or be used for work requiring closer grained iron. Of course, when more high test iron is melted there is less dilution and larger taps may be taken.

If first attempts are to be used for ½-inch work, it is advisable to have alternate heavier sectional work ready for pouring, and if the wedge is too high this heavier work may be poured. This is merely a precaution and should not be necessary.

Pour Wedge Tests

So that there will be no hitch in production, the foundry must familiarize itself with the wedge test before proceeding with high test irons. Base wedges should be taken daily, and all high test irons must have a base wedge of over 20/32-inch. The final wedge must never be over one-third of the section it is poured into.

Tensile strength of 50,000 to 60,000 per square inch is the approximate upper limit of strength that can be reached consistently following the simple rules reviewed in this article. This is by no means the highest strength attainable in gray iron. Irons with strengths up to 80,000 pounds per square inch can be produced in the same manner, but with larger additions of alloys. These higher strengths are attained with an acicular structure, which is produced by a combination of nickel and molybdenum. Nickel in this type of iron ranges from 1.00 to 3.00 per cent, and molybdenum up to 1.50 per cent. It is not recommended that the foundry attempt to produce this until it is thoroughly familiar with the production of ordinary high test iron. The wedge test, in this highly alloyed iron, will no longer indicate machinability, which must now be determined by analysis.

Bohn Aluminum & Brass Corp., Detroit, has formed a subsidiary, the Aluminum Refiners Division, which will specialize in refining aluminum scrap into aluminum alloy ingot.

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Adventures of Bill

(*Concluded from page* 114)

of the mold.

"I advised him before the drag is rolled over to vent it completely with a ¼-inch wire, especially around the hub. Rub the bottom board to a bearing and then remove it temporarily while using the vent wire. After using the wire, make a number of channels in the face of the sand projecting slightly above the edges of the drag. He probably is familar with the different methods of making these channels with the corner edge of the board, a straight edge, with the fingers, or by bringing the vent wire down smartly and horizontally to form a series of diamond shaped indentations in the sand. When the bottom board is returned to place a few wedges are inserted between board and drag to preserve the vent openings when the flask is clamped.

"The present gating system is partly to blame for the trouble. The metal is flowing too long in a thin stream over the flat surface before the hub is filled. Also the gates and risers represent a waste of metal. The ideal gate for this job is a small dry sand cup core which fits over the top of the center core print and is rammed up with the cope. The bottom of the cup is pierced with six or eight ¼-inch pencil gates. The casting does not require a riser."

Book Review

Industrial Inspection Methods, by Leno C. Michelon, cloth, 389 pages, 8 x 10¾-inches, published by Harper & Bros., New York, price $3.50.

The subject of industrial inspection methods, has been considered under five section headings. Section one deals with dimensional control and discusses types of measuring instruments, their use and care. Testing to check physical properties of metals is covered in section two. These tests include hardness, destructive, x-ray inspection and magna flux inspection. Section three is in regard to surface inspection and section four covers organization of an inspection department. Section five is the appendix and includes tables pertaining to the material covered in the text. The book is well illustrated and is complete with a cross index.

American Society for Testing Materials, 260 South Broad street, Philadelphia, has issued a 43-page bulletin containing tables of data giving information on the chemical compositions and physical and mechanical properties of wrought corrosion-resisting and heat resisting chromium and chromium-nickel steels. Copies of the bulletin may be obtained for $1.25 from the society.

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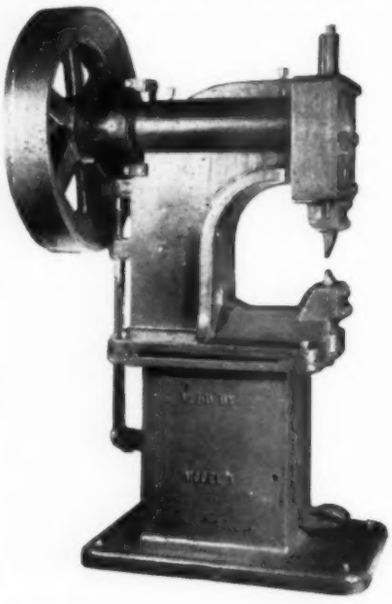

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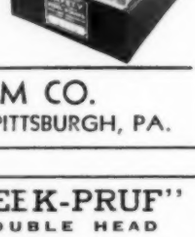

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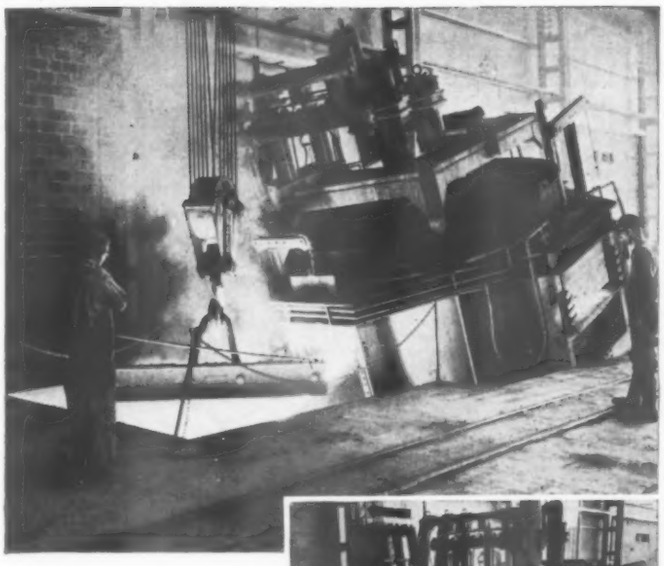

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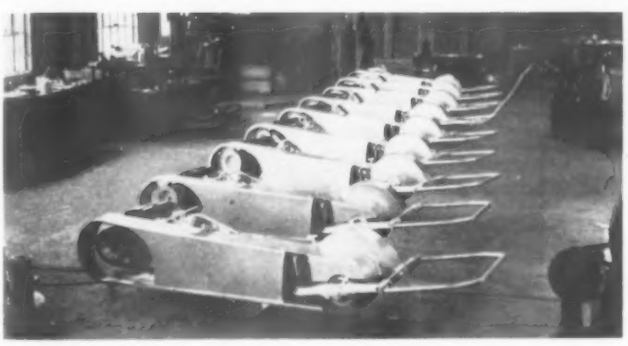

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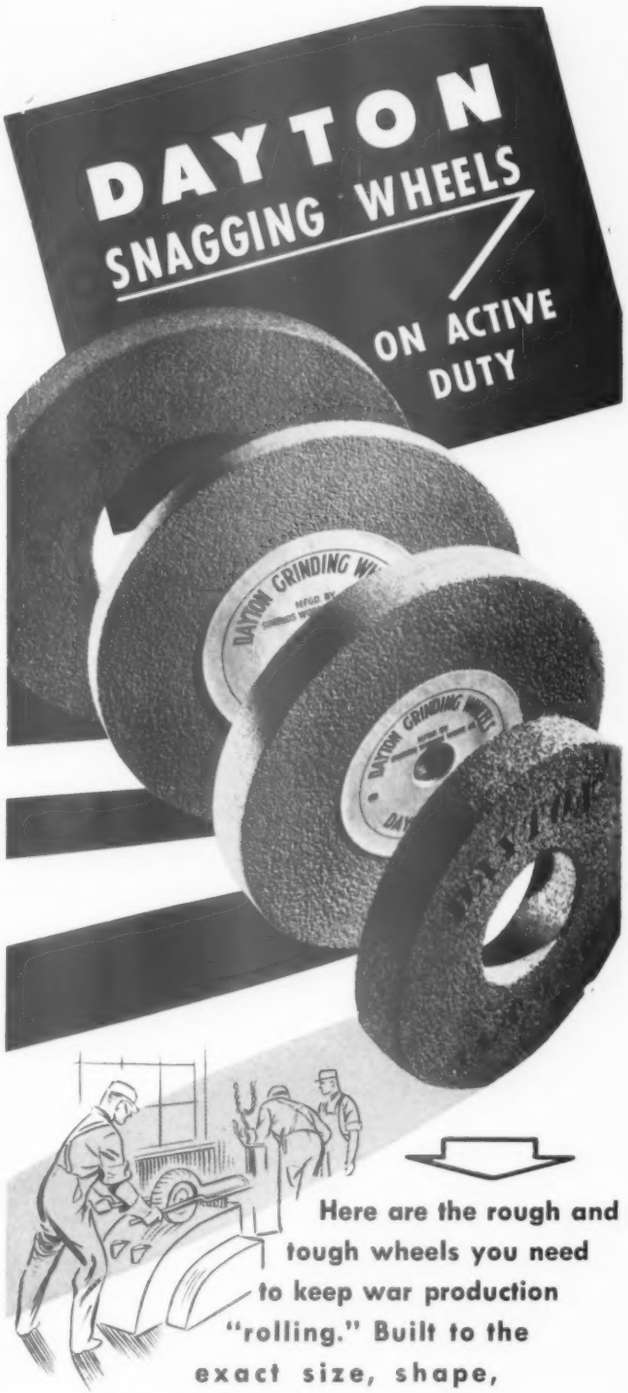

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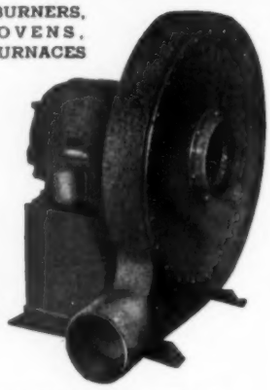

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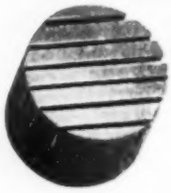

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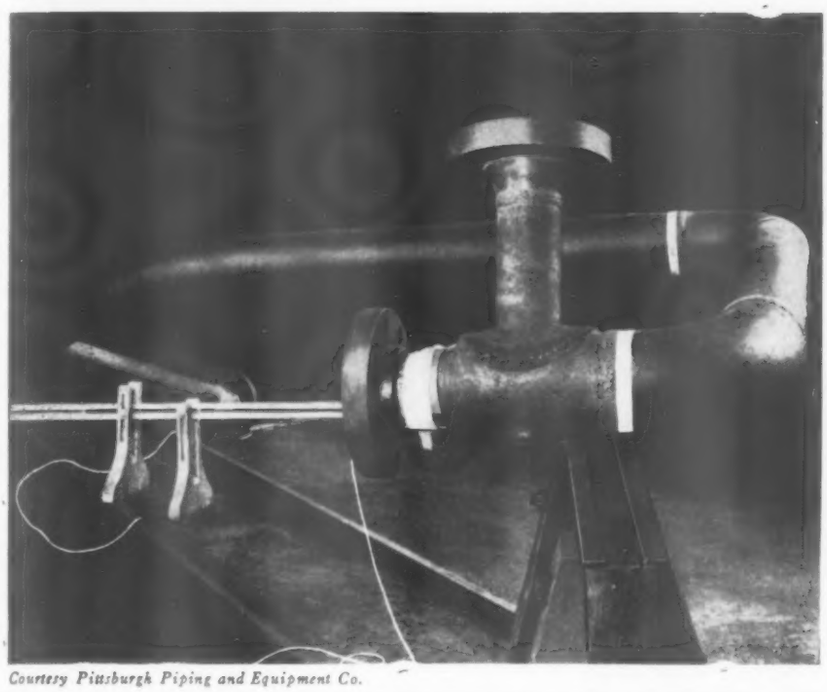

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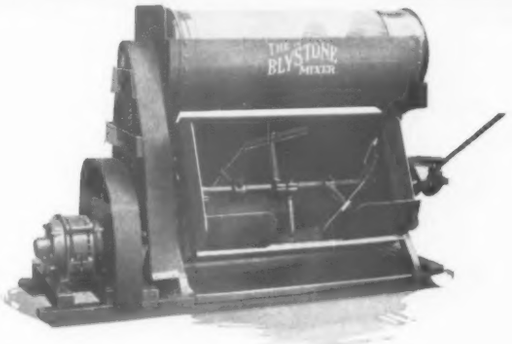

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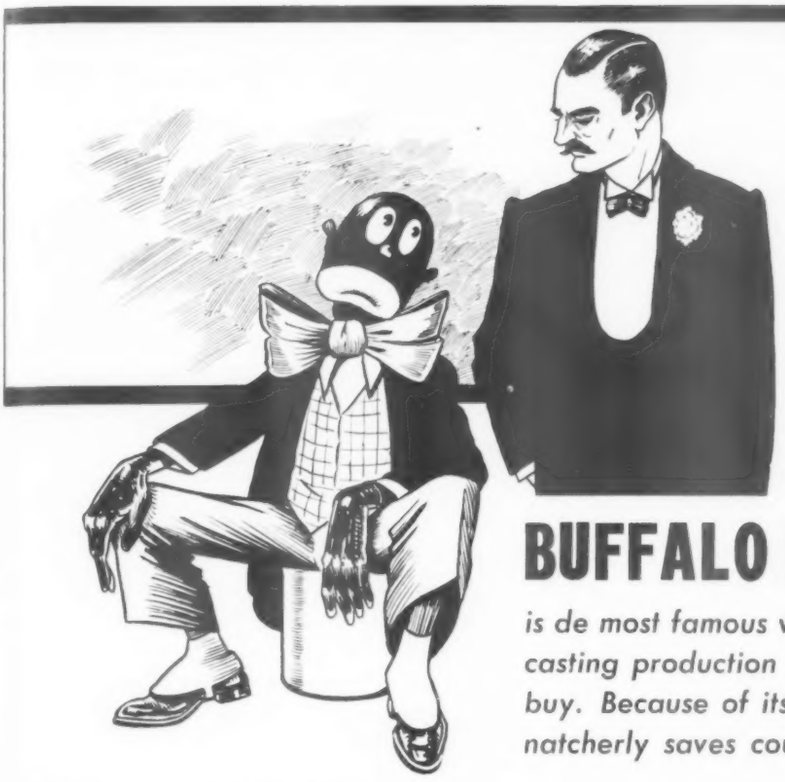

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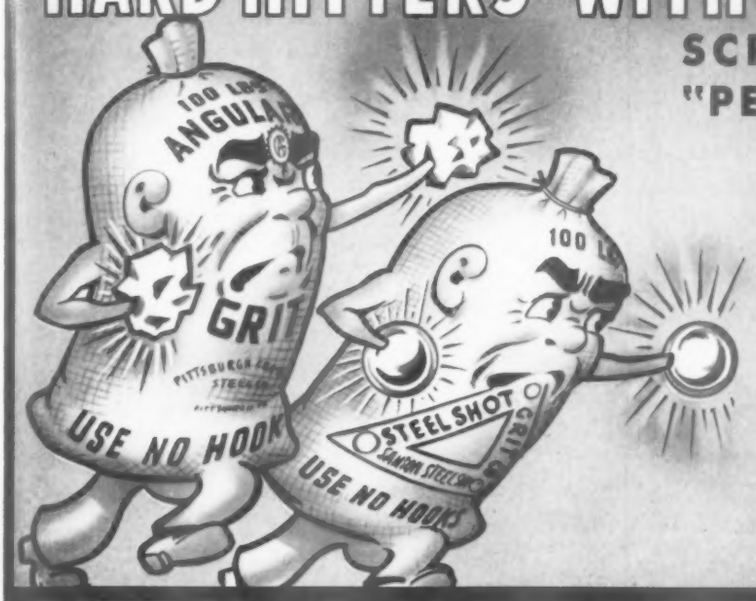

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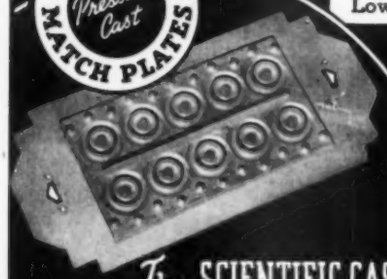

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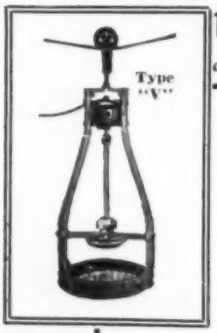

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19. Tool Salvaging

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Black & Decker Mfg. Co. and Van Dorn Electric Tool Co.—Booklet entitled "They Used Their Heads" is a publication dealing with the adaptation of portable electric tools to war production emergencies. There are photographs of the varied operations. Interesting.

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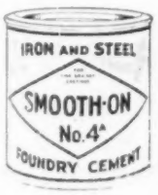

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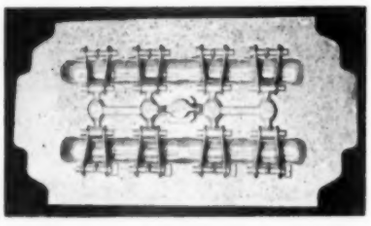

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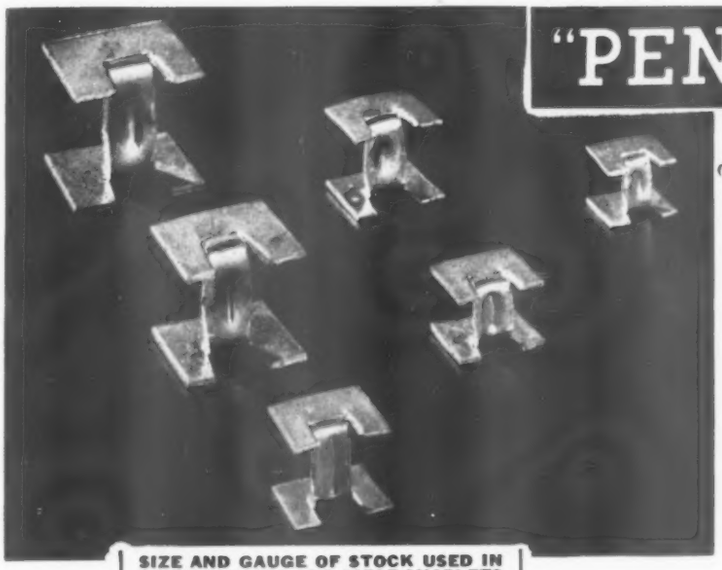

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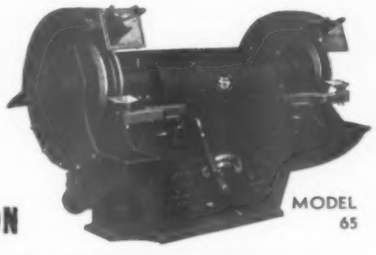

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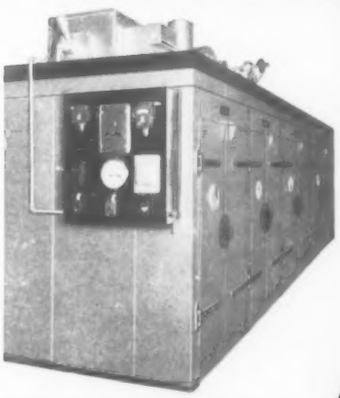

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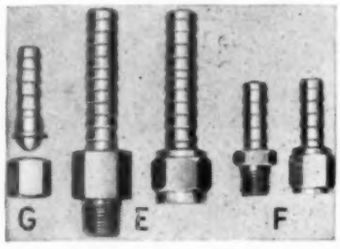

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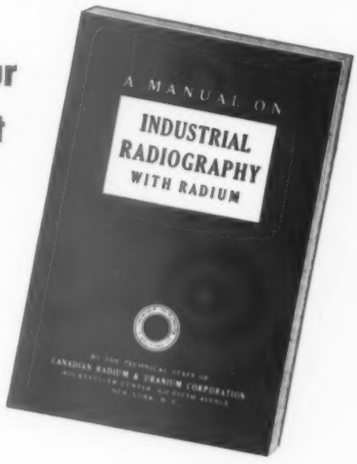

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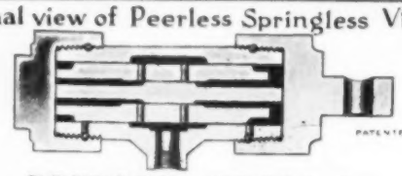

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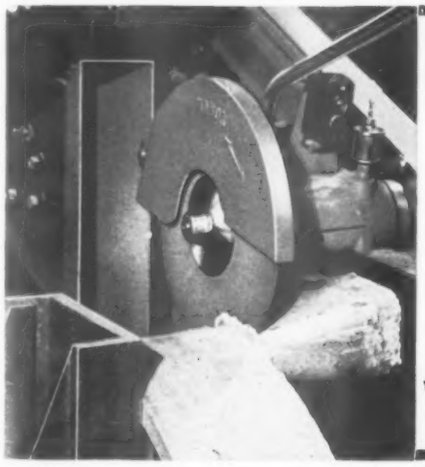

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Experienced on castings and patterns for steel and gray iron. Must be able to plan production equipment and estimate casting weights. Give age, family status, experience and salary expected. Address: THE WESTERN FOUNDRY COMPANY, 3634 SOUTH KEDZIE AVENUE, CHICAGO, ILLINOIS.

CORE ROOM FOREMAN

Experienced man for general jobbing gray iron foundry in Central Ohio. Light and medium castings produced. To take charge of fifteen men in Core Room. Write, giving age, qualifications, experience, and salary desired. Address Box 946, The FOUNDRY, Cleveland.

SALESMAN WANTED

To sell **gray iron castings,** machined and unmachined, in New York Metropolitan area and vicinity for production foundry with capacity of one thousand tons per month. Address Box 907, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN WANTED

For Gray Iron Jobbing foundry producing medium and heavy jobbing work. Must be a good rigger, experienced on cupola and know how to handle men. Good opportunity for a hustler with a growing concern in the Middle West. State age, experience and salary; also references. Address Box 939, The FOUNDRY, Cleveland.

STEEL FOUNDRY FOREMAN

Desire foreman or assistant foreman with previous experience. However, man with steel molding experience or background and capable of rigging, gating or risering jobs would be considered. Address Box 937, The FOUNDRY, Cleveland.

CLASSIFIED RATES

Position Wanted: 5c per word, minimum $1.50. Help Wanted: 6c per word, minimum $3.00. All other type advertisements: 10c per word, minimum $3.00. Copy should be received not later than 13th of month preceding date of issue. Address: The FOUNDRY, Penton Building, Cleveland.

Help Wanted

MALLEABLE FOREMAN

For light work foundry. Give former employers, length of time and nature of work done with each. Approximate starting salary and age. Address Box 928, The FOUNDRY, Cleveland.

JUNIOR CHEMIST WANTED

Having had some experience analyzing nonferrous metals. Opportunity to get away from routine jobs. This will continue through and after duration. Address Box 926, The FOUNDRY, Cleveland.

FOUNDRYMAN

One to act as **foreman.** Must be a practical foundryman and experienced in bronze and aluminum. Western New York Area. Write giving experience, references, and salary in first letter. Address Box 921, The FOUNDRY, Cleveland.

MOLDING FOREMAN

For large steel foundry in Chicago area. Thoroughly experienced in machine, floor, and sandslinger operation, medium and heavy steel castings. Permanent position. State age, experience with references, and salary expected. Address Box 922, The FOUNDRY, Cleveland.

ASSISTANT FOUNDRY SUPERINTENDENT

Wanted who is experienced in medium and gray iron castings. State experience. Address Box 942, The FOUNDRY, Cleveland.

Positions Wanted

GRAY IRON FOREMAN

Wants position in shop casting up to six ton per day. Technically trained. Age 39. Now in No. California. Western States only. Address Box 890, The FOUNDRY, Cleveland.

SUPERINTENDENT-MANAGER

With good record and liberal education desires position with reliable brass and aluminum foundry. Has some knowledge of magnesium. Thoroughly grounded in melting, production and purchasing. Address Box 927, The FOUNDRY, Cleveland.

GRADUATE METALLURGICAL ENGINEER

Twenty years' experience in all phases of ferrous and nonferrous jobbing foundries. Is available after January 1943. Age 50. Address Box 900, The FOUNDRY, Cleveland.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—taken two out of the red. Available for service shortly with medium-sized company requiring reliable directing ability in management, sales, finance and production. Extensive experience foundry, machinery, tool and related lines. Address Box 310, The FOUNDRY, Cleveland.

COREMAKER

With many years' experience in iron jobbing foundry. Steady and reliable. Address Box 938, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRYMAN

Twenty-one years as superintendent, medium and heavy high-grade green and dry sand castings, jobbing and machinery. Practical molder and coremaker. Best of cupola practice. Broad experience to take full charge of all departments. Prefer location having moderate climate. Address Box 930, The FOUNDRY, Cleveland.

Classified Advertising

Positions Wanted

BRASS FOUNDRY SUPERINTENDENT

Long experience in all phases of nonferrous foundry practice. Sober, industrious, good executive capable of assuming full charge. Address Box 933, The FOUNDRY, Cleveland.

FOREMAN

Has been General Foreman for thirty years in small and large foundries; jobbing machinery, castings. Is practical molder and understands foundry practice in every detail. New Jersey preferred. Address Box 943, The FOUNDRY, Cleveland.

CORE FOREMAN

Wants position. Age 43. Now in Ohio. Has had 26 years' experience as core maker and foreman. Expert in production work. Address Box 941, The FOUNDRY, Cleveland.

FOUNDRY MANAGER OR SUPERINTENDENT

Twenty-five years' experience in the foundry. Thorough knowledge of gray iron, semi-steel, and aluminum. Experienced in light, medium and heavy work. References. Address Box 944, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Thirty years' foundry experience of which has been superintendent and general foreman for twenty years on jobbing machinery, castings, and practical foundryman in every detail. Best reference. Address Box 919, The FOUNDRY, Cleveland.

METALLURGIST

Experienced in the production of acid electric carbon and alloy steel castings and gamma-ray. Capable of handling men. Address Box 947, The FOUNDRY, Cleveland.

MASTER MECHANIC

(Assistant or Electrical Engineer) foundries and manufacturing plants. Twenty years' experience, maintenance or construction. Address Box 948, The FOUNDRY, Cleveland.

Employment Service

SALARIED POSITIONS

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

Opportunities

MOLDING SAND COMPANY

IN SOUTHERN OHIO WITH MILLS AND FULL MECHANICAL EQUIPMENT. SALES 10,000 TONS PER YEAR TO MOSTLY OLD CUSTOMERS. BUSINESS AND EQUIPMENT CAN BE SOLD SEPARATELY AND A SMALL ROYALTY FOR THE SAND, OR BUSINESS EQUIPMENT AND 75 ACRE FARM CAN BE BOUGHT. OWNER RETIRING ON ACCOUNT OF AGE AND HEALTH. SAND IS HIGHEST GRADE FOR HEAVY WORK. ADDRESS BOX 945, The FOUNDRY, CLEVELAND.

Wanted-To-Buy

STEEL FLASKS WANTED

9" to 12" wide, 2' to 6' long, minimum 6" drags, 4" copes. Advise condition, quantity of each size and price.

Hallstead Iron Foundry
Hallstead, Pa.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

WANTED

POWER ROLLOVER MOLDING MACHINE TO TAKE FLASK 30" BY 48".

ALBANY CASTINGS COMPANY INC.
VOORHEESVILLE, NEW YORK

Foundry Work Wanted

FOUNDRY CAPACITY AVAILABLE

Ferrous and non-ferrous. War orders being accepted for production beginning May 1, 1943. Good location within 100 miles of Chicago. Address Box 889, The FOUNDRY, Cleveland.

For Sale

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.
ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1392 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

FOR SALE

One No. 6 Piqua positive pressure blower, 20" x 60"—35 ft. displ. top discharge, mounted on bed-plate direct connected to 40 h.p. Wagner 3/60/220 A. C. motor, with starter . . . used.

Mahr Mfg. Company
1709—22d St., N.
Minneapolis, Minn.

For Sale

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
406 N. Peoria St. Chicago, Ill.

FOR SALE

1 Royersford tumbling mill.
1 cupola, 44" shell.
3 ton hand crane, core oven, molding boxes.
2 Electric motors, 10 H. P.
1 Connersville blower, 1 Buffalo blower and fan. Band saw, etc. 3 scales—1 ten ton, one 2 and smaller one. The building is of concrete blocks 56' x 54', 150 ft. frontage on St. Clair River. For sale or rent with back building for patterns and storage.

Riverside Foundry,
Port Huron, Michigan

REBUILT COMPRESSORS AND BLOWERS

(3) Buffalo Forge Pressure Blowers, 1200 cfm @ 11 oz., 9½" inlet, 7 x 7 outlet, driven by 7½ H.P. A.C. Motors.
150 CFM, 3500 RPM Gen. Elec. with 6.2 H.P. A.C. motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

The Motor Repair & Mfg. Co.
1552 Hamilton Ave. Cleveland, Ohio

FOR SALE

1 tilting crucible furnace No. 60, Denver fire clay, gas fired, no fan or motor. Never used.

Eastman Kodak Company
Kodak Park Works
Rochester, N. Y.

FOR SALE

No. 4 Roots blower, 5 psi pressure, 12 inch discharge, 6.5 cu. ft. displacement.
50 h. p., 220 volt, 3 phase, 1200 r.p.m. motor and starter.
Address Box 929, The FOUNDRY, Cleveland.

FOR SALE

16" x 48" used Roots blower with 54" x 10" flat pulley. Address Box 936, The FOUNDRY, Cleveland.

FOR SALE
PANGBORN SAND BLAST

Type 2 GH—5 cu. foot barrel capacity. Direct pressure blast application. Complete unit with blast machine and abrasive separator. Arranged for motor drive. This unit is in perfect condition. Price cheap.

GLOBE TRADING COMPANY
920 W. Lafayette Blvd.
Detroit, Mich. Cad. 0198

Classified Advertising

For Sale

FOR SALE

One—Size No. 1 American Foundry continuous sandblasting mill, complete with ventilating equipment.

Unit is in first-class operating condition.

SOSS MANUFACTURING CO.
Box 38, Harper Station **Detroit, Michigan**

WELDING EQUIPMENT

Welding, Cutting, Aircraft, Sheet-Metal, Soldering Outfits, Torches, Regulators and Gages, Acetylene Generators, Supplies, Electric Arc Welders. SUPERIOR OXY-ACETYLENE CO., HAMILTON, Dept. B, OHIO.

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. **Kalamazoo, Mich.**

EQUIPMENT IN STOCK

GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—No. 60 Crucible Fisher Stationary Furnace, oil fired with new lining and cover.

(2)—1¾" cap. Shuster Power Sprue Cutter.

(4)—large flask vibrators.

(1)—10-HP. Black & Decker, double end 230-VDC Grinder, capacity 24" wheels.

AIR COMPRESSORS & BLOWERS

(1)—12 x 12 Chicago N.S.B. 375-CFM. @ 100 lbs. with idler, unloader and lubricator.

(1)—12 x 10 Penna. 365-CFM. @ 100 lbs. belt drive, 60-HP. C.W. slip ring motor, 220/3/60-cy.

(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.

ELECTRIC MONORAIL HOISTS

(30)—½ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 230/440-volts, 3-Ph. 60-CY, 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1) to 50-tons cap. 18' 0" to 91' 0" span, 220/440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 Clarissa St. **Philadelphia, Pa.**

For Sale

FOUNDRY EQUIPMENT

1—5'y motor driven rotary sand blast mill, B. B. drive.

30" x 30" barrel, 22" door opening. With sand blast tank, bucket conveyor and steel hopper.

1—Pangborn high pressure steel sand blast unit.

Steel house 7' x 8' x 7' high, Type N. B. Size 33.

With bucket elevator, sand blast tank and exhauster.

Immediate Shipment.

DELTA EQUIPMENT COMPANY

148 N. 3d St. **Philadelphia, Pa.**

FOR SALE

2—Ingersoll-Rand Floor Rammers
1—Ingersoll-Rand Chipping Hammer
1—Ingersoll-Rand Air Grinder
1—2000 lb. Geared Ladle (Lined)
1—McLeod Open Sand Blast Equipment

LAVELLE GRAY IRON FOUNDRY CORP.
Box 798 **Anderson, Indiana**

FOR SALE

Annealing pots and bottoms, Cupola and furnace from malleable castings foundry.

Immediate Delivery

Chicago District

HYMAN-MICHAELS COMPANY
122 S. Michigan Ave. **Chicago, Ill.**

NEEDED IMMEDIATELY!

If you have used foundry equipment of any kind, we urge that you tell the industry about it through the Classified Advertising pages of The FOUNDRY. Much equipment which may be obsolete in your plant might be just what some other foundry is looking for. Communicate with us.

The FOUNDRY

CLASSIFIED ADVERTISING DEPARTMENT
Penton Building **Cleveland, Ohio**

For Sale

FOR SALE

1—American Foundry Equipment Co. Humane Rotary table sand blast, approx. 8' diameter
1—Square tumbling barrel as manufactured by Royersford Foundry, 3' dia. x 6½' long, pulley driven.
1—No. 40 Clarage fan, style C, vertical discharge 16" x 18".

CHARLES V. FISH
501 Commonwealth Building
Allentown, Pennsylvania

FOR SALE

One No. 7, 60" dia. 30' 0" high Whiting Cupola. One 46" dia. 30' 0" high. Both complete with blowers. Address Otto Biefeld Company, Watertown, Wisconsin.

FOR SALE

Three Osborn jolt squeeze rollover pattern draw molding machines, type 332. Address Box 931, The FOUNDRY, Cleveland.

FOR SALE OR TRADE

18" x 76" Standard make tumbling barrel. Good condition; or will trade for good rotary sandblast. Address Box 906, The FOUNDRY, Cleveland.

SPECIAL DEFENSE BARGAINS

Air Receivers up to 42" dia.

60" Cupola stack sections only.

Fans—Blowers—Exhausters for cooling, ventilation, dust or fumes removal, cupolas, etc.

Fan or **Centrifugal** style blowers—Maxon-Premix—from No. 0 to No. 4. Spencer Turbine, Am. Blower Co., Sturtevant, Buffalo, Clarage, Ilg etc. for Gas or Oil fuel Combustion.

Rotary Pressure Blowers — Roots-Connersville, Garden City, Green, Piqua, Sturtevant, Am. Gas Furnace Co. etc. Send specifications.

Furnaces for Brass and Aluminum Melting—Hausfeld Tilting Brass or Aluminum open flame, 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Molding Machines—"Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock. Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen.

Crane Ladles—¾, 1, 2 tons cap. Rim Pour.
1—25 H.P. Diesel Engine, horizontal.
1—Beardsley & Piper Gyratory sand screen size 36" x 59"—1 H.P. Ball Bearing 3/60/220 A.C. Motor, Vee Belt Drive.

Sand Blast Barrel—Macleod 36 x 36" for belt drive.

Sand Blast Room—All steel 9'-10" x 20'-9" operators grilled table 3' x 10', down draft dust exhaust—8' ceiling. Air inlet thru ceiling.

Core Oven—Small portable 4 separate shelf compartments each. 20" deep x 32" wide x 6" high for gas fuel.

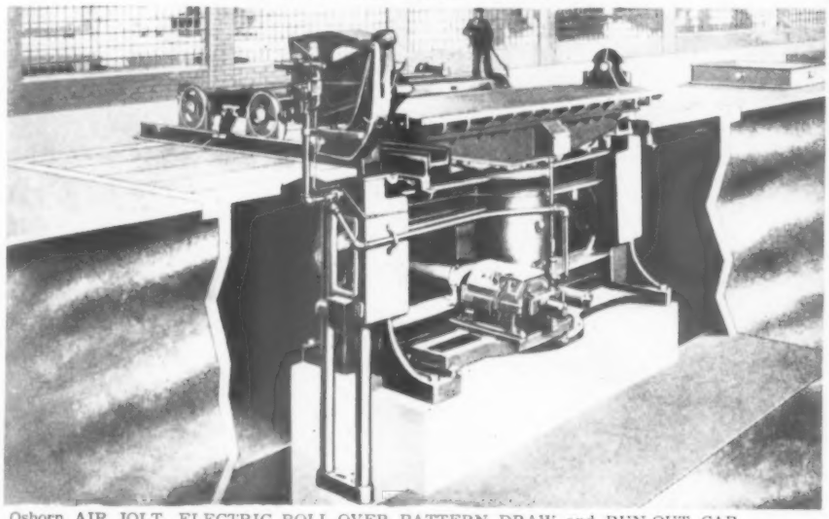
Tell us your needs.

CLIFTON MACHINERY CO.
1023 W. 6th, CINCINNATI, O.

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

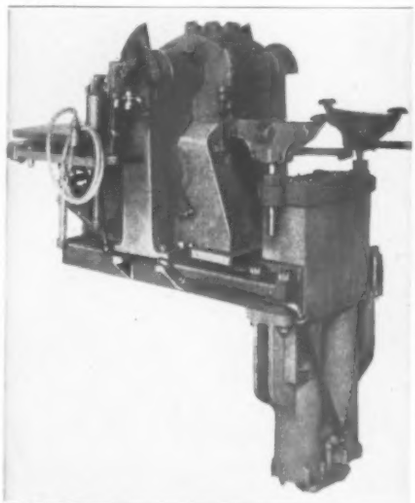
OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

INTERNATIONAL MOLDING MACHINES

Type "F" 48 x 16" draw, comb. jar ramming, power turn-over power draw, 4000 lbs. cap. @ 80 lbs. press., 48 x 83" table.



INTERNATIONAL TYPE "F"
(Enclosed Model)

Type "F" 49 x 16" draw, comb. jar ramming, power turn-over and power draw, fitted with air equalizers, rollers in the draw section and hand operated core box clamps (rollers can be readily removed) jar plate 100" long, 6000 lbs. cap. @ 80 lbs. pressure.

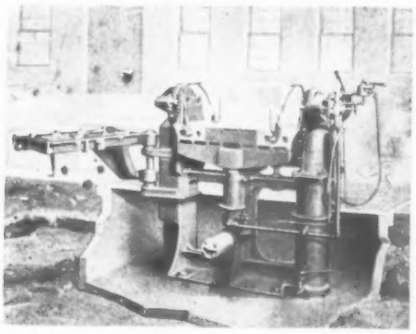
International Type "F" comb. jar ramming power turn-over power draw, 26 x 12" draw, 900 lbs. cap.

International Type "F" 30 x 12" draw, 1800 lbs. cap. @ 80 lbs. pressure.

HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.
60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.
46 x 56" roll-over, 40 x 50" bumper, 3000 lbs. cap. @ 80 lbs.

OSBORN Jolt Roll-Over Pattern Draw Molding Machines



No. 403, flask cap 44 x 36" pattern draw 12"—1400 lbs. cap. @ 80 lbs. press. with swing-out Mold Table.
No. 405, flask cap 50 x 64"—pattern draw 18", 3000 lbs. cap. @ 80 lbs. press. with run-out Mold Car.

Osborn "Little Wonder"
CORE ROLL-OVER MACHINES

No. 45-P, Length O/A 24", Width O/A 20", pattern draw 8", height of roll-over table from floor 28".

No. 46-P, Length O/A 32", Width O/A 24", pattern draw 8", height of roll-over table from floor 24".

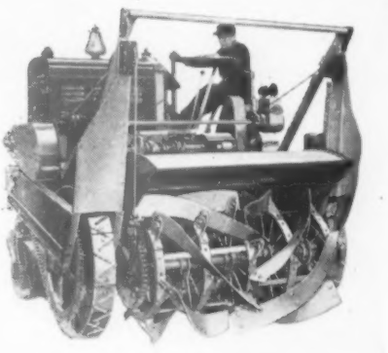
No. 47-P, Length O/A 40", Width O/A 22", pattern draw 8", height of roll-over table from floor 24".

60" SCHWARTZ Furnace, teapot type, oil fired, hand tilting.

AMERICAN SANDCUTTERS

Model "AA" size 72, 60" cutting cyl. 72" between tractor wheels, complete with 7½ HP AC Motor, Cable and Reel.

Model "AA" 68" cutting cylinder, 88" between tractor wheels, equipped with 15 HP Crocker-Wheeler 220V AC Motor, Cable and Take-Up Reel.



Cleveland Model "B" Type 5-55, 55" spiral cutting cyl. 26" dia.—66" between tractor wheels, equipped with 3 Cleveland Elec 220V AC Motors, Cable and Take-Up Reel.

Model "K" size 84"—72" cutting cyl. 84" between tractor wheels, 6" face, equipped with 30 HP Westinghouse 3/60/220V AC Induction Motor, Cable and Take-Up Reel.

Model "K"—84" spiral cutting cyl. 36" dia.—92" between tractor wheels, 5" face, equipped with 3—220V AC Motors, Cable and Take-Up Reel.

NO. 2 DEMMLER
CORE BLOWING MACHINES

JOLT SQUEEZE & STRIP POWER

Milwaukee No. 113 Jolt Squeeze Strip, open end type, portable, 500 lbs. cap. @ 80 lbs. press. 6" draw, 16 x 35" table.

No. 142 Milwaukee, stationary, stripping cap. 1200 lbs. @ 80 lbs. press., draw 6" table 19 x 35"—open end type.

Nicholls Type "D" stationary, heavy duty JOLT SQUEEZE and PATTERN DRAW, squeeze piston 14", jolt piston 6"—draw 2-6", take approx. 15 x 24" flask, distance between strain rods 40".

OVERHEAD ELECTRIC TRAVELING CRANES

35-ton Morgan Power House Type 4-motors 550V DC with Aux Hoist, Chain on Main Hoist Cable on Aux, approx. 36 ft. span.

10-ton P&H approx. 27 ft. span, 3-motor type, 220V DC motors, cab oper., drum type cont. 25 ft. lift (double drum type Trolley).

5-ton Shepard approx. 18'5" span, 1-motor type 6 HP 220V DC, trolley and bridge hand racked, boxed girders.

5-ton 3-motors cage operated approx. span 33' 115V DC Motors, double web fish belly box girders, structural end trucks, 20' lift.

1½-2 tons DETROIT Type "H" LoHed Room, 3-motors, floor oper., approx. span 27'5" 3/60/220V AC 15" "I" Beams.

No. "0" 3 ft. dia. single muller Simpson Mixer complete with 5 HP AC Motor and Reducer.

SCULLY MACHINERY & EQUIPMENT CORP.

(Formerly – Foundry Division of Scully-Jones & Co.)

2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

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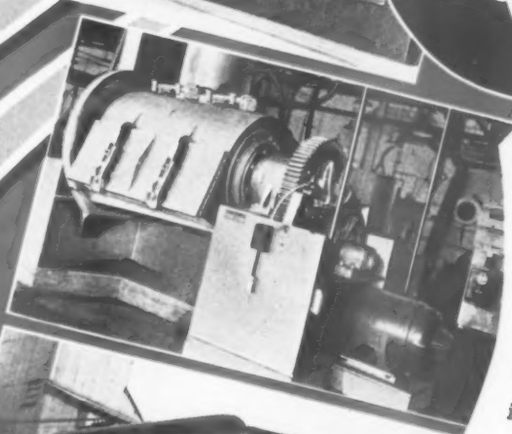

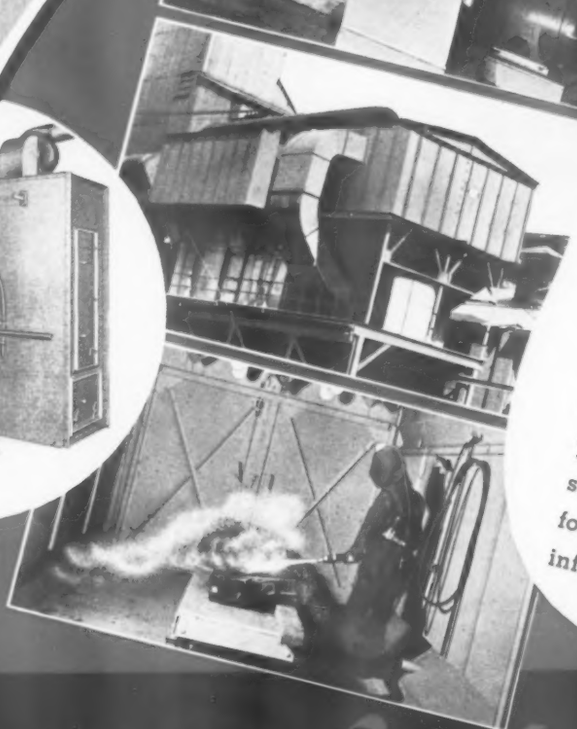

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Makes the Pasted Joint Stronger than the Core

STEVENS NO. 3 CORE PASTE

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- Thus it goes farther—makes a smooth mix—easy to apply
- Develops maximum strength very rapidly
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- When applied to one-half of the joint—it adheres firmly to the other half *immediately* upon pressing them together

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ELIMINATES PASTING TROUBLES!

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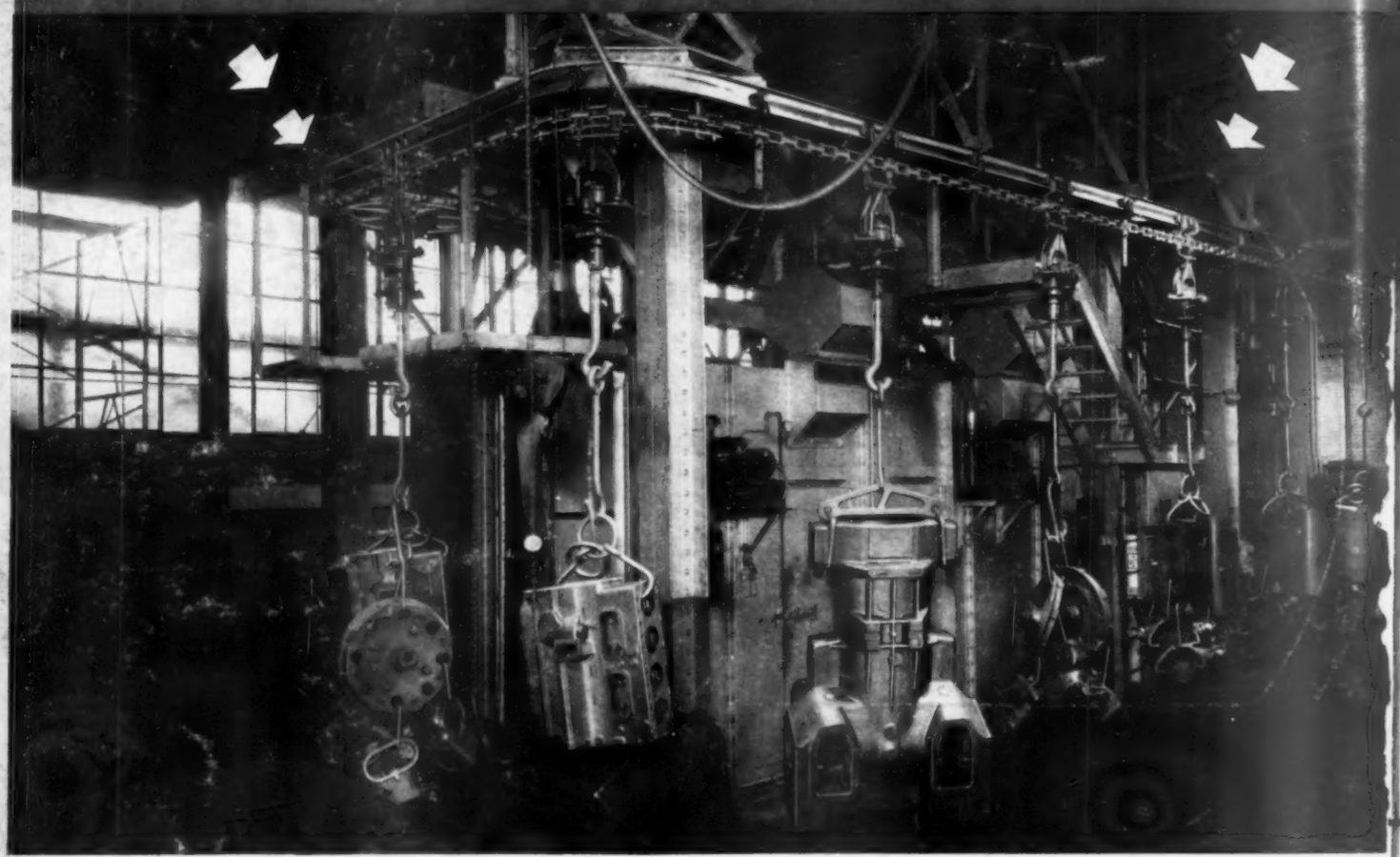

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